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NATIONAL DAM SAFETY PROGRAM. SLEEPY VALLEY DAM (NJ00763), WALLK--ETC(U)
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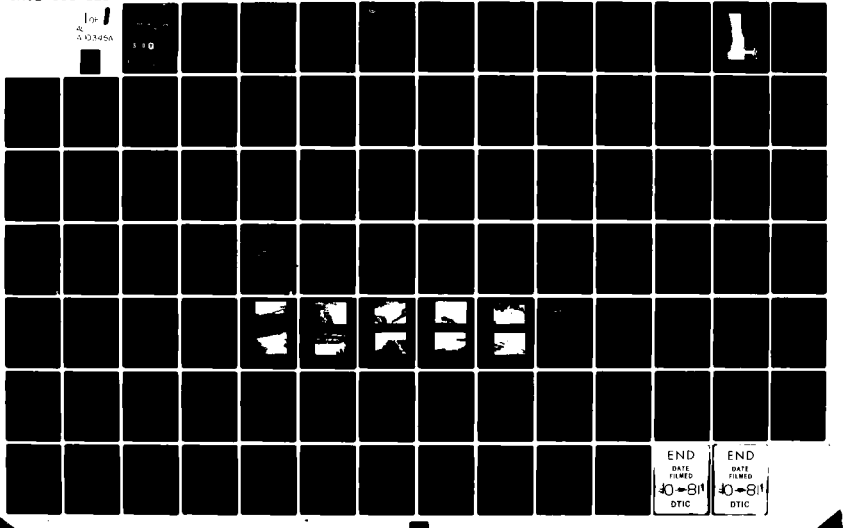

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WALLKILL RIVER BASIN
TRIBUTARY TO WALLKILL RIVER
SUSSEX COUNTY
NEW JERSEY

SLEEPY VALLEY DAM
NJ 00763

PHASE 1 INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

DEPARTMENT OF THE ARMY
Philadelphia District
Corps of Engineers
Philadelphia, Pennsylvania

JULY 1981

REPT. NO: DAEN/NAP-53842/NJ00763-81/07

National Dam Safety Program. Sleepy Valley Dam (NJ00763), Wallkill River Basin, Tributary to Wallkill River, Sussex County, New Jersey. Phase I Inspection Report.

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Sleepy Valley Dam, NJ00763
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Embankments	Sleepy Valley Dam, N.J.	Riprap
Visual Inspection	Spillways	
Structural Analysis	Seepage	

20. ABSTRACT *(Continue on reverse side if necessary and identify by block number)*
This report cites results of a technical investigation as to the dam's adequacy. The inspection and evaluation of the dam is as prescribed by the National Dam Inspection Act, Public Law 92-367. The technical investigation includes visual inspection, review of available design and construction records, and preliminary structural and hydraulic and hydrologic calculations, as applicable. An assessment of the dam's general condition is included in the report.

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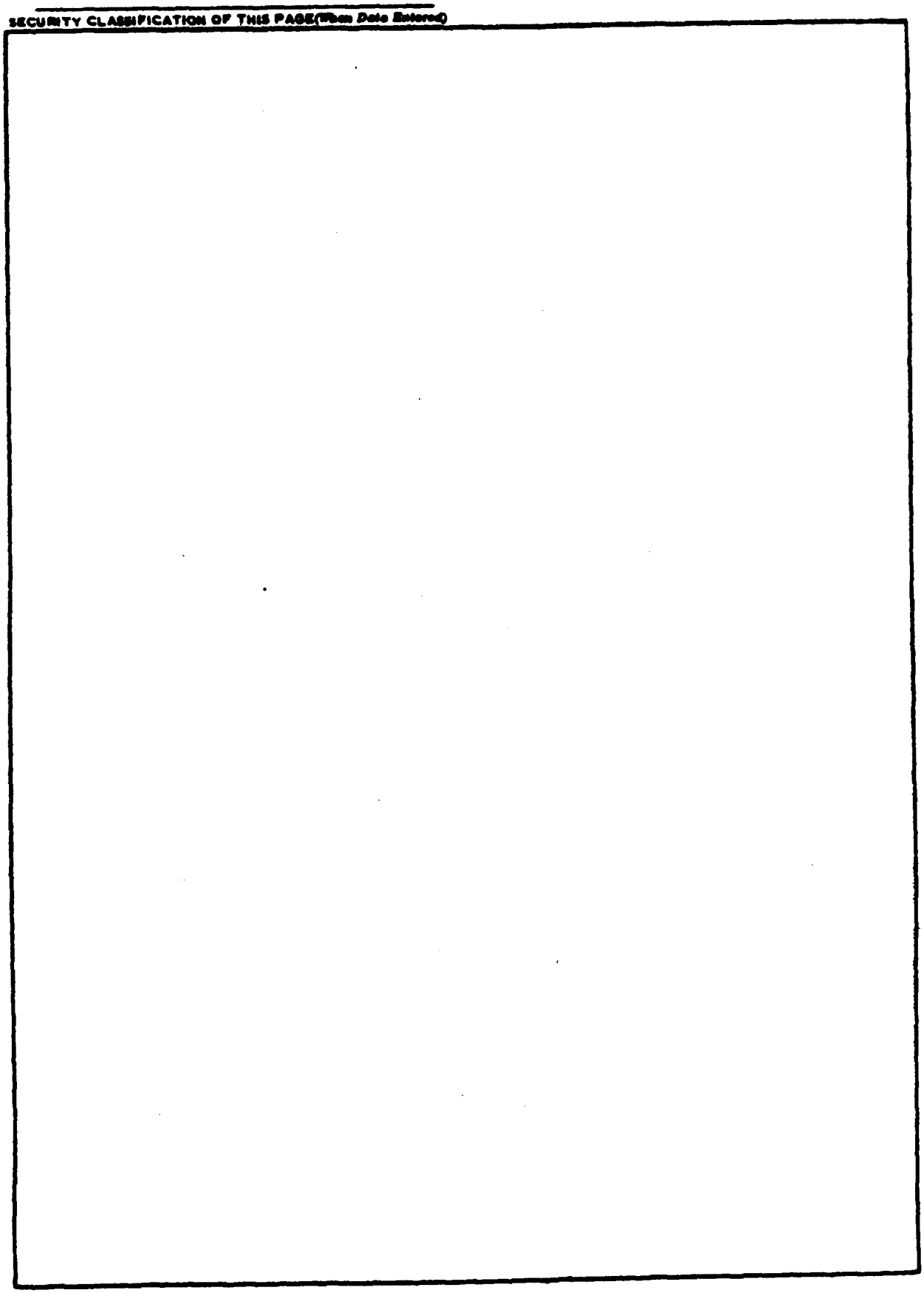

DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
CUSTOM HOUSE—2 D & CHESTNUT STREETS
PHILADELPHIA, PENNSYLVANIA 19106

IN REPLY REFER TO
NAPEN-N

31 JUL 1981

Honorable Brendan T. Byrne
Governor of New Jersey
Trenton, New Jersey 08621

Dear Governor Byrne:

Inclosed is the Phase I Inspection Report for Sleepy Valley Dam in Sussex County, New Jersey which has been prepared under authorization of the Dam Inspection Act, Public Law 92-367. A brief assessment of the dam's condition is given in the front of the report.

Based on visual inspection, available records, calculations and past operational performance, Sleepy Valley Dam, initially listed as a high hazard potential structure, but reduced to a significant hazard potential structure as a result of this inspection, is judged to be in fair overall condition. The dam's spillway is considered inadequate because a flow equivalent to 27 percent of the Spillway Design Flood (SDF) would cause the dam to be overtopped. To ensure adequacy of the structure, the following actions, as a minimum, are recommended:

a. The spillway's adequacy should be determined by a qualified professional consultant engaged by the owner using more sophisticated methods, procedures and studies within six months from the date of approval of this report. Within three months of the consultant's findings remedial measures to ensure spillway adequacy should be initiated.

b. Within six months from the date of approval of this report the owner should engage a qualified professional consultant to perform the following:

(1) Arrangements should be made to monitor the seepage on a periodic basis in order to detect any changes in its condition.

(2) The ability to drain the lake should be investigated. If the need for a low level outlet is determined, the outlet works should be restored to proper operational condition or replaced.

c. Within six months from the date of approval of this report the following remedial actions should be initiated:

(1) Trees and adverse vegetation on the embankment should be removed.

(2) Spalled and deteriorated portions of the concrete piers and abutments should be repaired.

(3) The timber flashboards should be repaired or replaced.

(4) Deteriorated sections of riprap on the upstream face of the dam embankments to the left of the spillway should be renovated.

d. The owner should develop written operating procedures and a periodic maintenance plan to ensure the safety of the dam, within one year from the date of approval of this report.

e. An emergency action plan and warning system should be developed which outlines actions to be taken by the owner to minimize the downstream effects of an emergency at the dam within six months from the date of approval of this report.

A copy of the report is being furnished to Mr. Dirk C. Hofman, New Jersey Department of Environmental Protection, the designated State Office contact for this program. Within five days of the date of this letter, a copy will also be sent to Congressman Courter of the Thirteenth District. Under the provision of the Freedom of Information Act, the inspection report will be subject to release by this office, upon request, five days after the date of this letter.

Additional copies of this report may be obtained from the National Technical Information Services (NTIS), Springfield, Virginia 22161 at a reasonable cost. Please allow four to six weeks from the date of this letter for NTIS to have copies of the report available.

An important aspect of the Dam Inspection Program will be the implementation of the recommendations made as a result of the inspection. We accordingly request that we be advised of proposed actions taken by the State to implement our recommendations.

Sincerely,

ROGER L. BALDWIN
Lieutenant Colonel, Corps of Engineers
Commander and District Engineer

1 Incl
As stated

Copies furnished:
Mr. Dirk C. Hofman, P.E., Deputy Director
Division of Water Resources
N.J. Dept. of Environmental Protection
P.O. Box CN029
Trenton, NJ 08625

Mr. John O'Dowd, Acting Chief
Bureau of Flood Plain Regulation
Division of Water Resources
N.J. Dept. of Environmental Protection
P.O. Box CN029
Trenton, NJ 08625

SLEEPY VALLEY DAM (NJ00763)

CORPS OF ENGINEERS ASSESSMENT OF GENERAL CONDITIONS

This dam was inspected on 29 January 1981 by Storch Engineers, under contract to the State of New Jersey. The State, under agreement with the U.S. Army Engineer District, Philadelphia, had this inspection performed in accordance with the National Dam Inspection Act, Public Law 92-367.

Sleepy Valley Dam, initially listed as a high hazard potential structure, but reduced to a significant hazard potential structure as a result of this inspection, is judged to be in fair overall condition. The dam's spillway is considered inadequate because a flow equivalent to 27 percent of the Spillway Design Flood (SDF) would cause the dam to be overtopped. To ensure adequacy of the structure, the following actions, as a minimum, are recommended:

a. The spillway's adequacy should be determined by a qualified professional consultant engaged by the owner using more sophisticated methods, procedures and studies within six months from the date of approval of this report. Within three months of the consultant's findings remedial measures to ensure spillway adequacy should be initiated.

b. Within six months from the date of approval of this report the owner should engage a qualified professional consultant to perform the following:

(1) Arrangements should be made to monitor the seepage on a periodic basis in order to detect any changes in its condition.

(2) The ability to drain the lake should be investigated. If the need for a low level outlet is determined, the outlet works should be restored to proper operational condition or replaced.

c. Within six months from the date of approval of this report the following remedial actions should be initiated:

(1) Trees and adverse vegetation on the embankment should be removed.

(2) Spalled and deteriorated portions of the concrete piers and abutments should be repaired.

(3) The timber flashboards should be repaired or replaced.

(4) Deteriorated sections of riprap on the upstream face of the dam embankments to the left of the spillway should be renovated.

d. The owner should develop written operating procedures and a periodic maintenance plan to ensure the safety of the dam, within one year from the date of approval of this report.

e. An emergency action plan and warning system should be developed which outlines actions to be taken by the owner to minimize the downstream effects of an emergency at the dam within six months from the date of approval of this report.

APPROVED: Roger Baldwin

ROGER L. BALDWIN
Lieutenant Colonel, Corps of Engineers
Commander and District Engineer

DATE: 31 July 81

PHASE I REPORT
NATIONAL DAM SAFETY PROGRAM

Name of Dam:	Sleepy Valley Dam, NJ00763
State Located:	New Jersey
County Located:	Sussex
Drainage Basin:	Wallkill River
Stream:	Tributary to Wallkill River
Date of Inspection:	January 29, 1981

Assessment of General Condition of Dam

Based on available records, past operational performance, visual inspection and Phase I engineering analysis, Sleepy Valley Dam is assessed as being in fair overall condition.

Based on investigations of the downstream flood plain made in connection with this report, it is recommended that the hazard potential classification be downgraded from high to significant hazard.

Hydraulic and hydrologic analyses indicate that the spillway is inadequate. Discharge from the spillway is not sufficient to pass the designated spillway design flood (100-year storm) without an overtopping of the dam. The spillway is capable of passing approximately 26 percent of the SDF. Therefore, the owner should engage a professional engineer experienced in the design and construction of dams in the near future to perform more accurate hydraulic and hydrologic analyses relating to the spillway capacity. Based on the findings of the analyses, the need for and type of remedial measures should be determined and then implemented.

The owner should, in the near future, develop an emergency action plan together with an effective warning system outlining actions to be taken by the operator to minimize downstream effects of an emergency at the dam.

Arrangements should be made in the near future to monitor the seepage on a periodic basis in order to detect any changes in its condition. The monitoring should be performed by a professional engineer experienced in the design and construction of dams.

In addition, it is recommended that the following remedial measures be undertaken in the near future:

1) The ability to drain the lake should be investigated by an engineer experienced in the design and construction of dams. If the need for a low level outlet is determined, the outlet works should be restored to proper operational condition or replaced.

2) Trees and adverse vegetation on the embankment should be removed.

3) Spalled and deteriorated portions of the concrete piers and abutments should be repaired.

4) The timber flashboards should be repaired or replaced.

5) Deteriorated sections of riprap on the upstream face of the dam embankments to the left of the spillway should be renovated.

In the future, the owner of the dam should develop written operating procedures and a periodic maintenance plan to ensure the safety of the dam.

Richard J. McDermott, P.E.

John E. Gribbin, P.E.

OVERVIEW - SLEEPY VALLEY DAM

29 JANUARY 1981

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PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. It is important to note that the condition of dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that the unsafe conditions be detected.

Phase I inspections are not intended to provide detailed hydraulic and hydrologic analyses. In accordance with the established Guidelines, the Spillway Test flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. The test flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydraulic and hydrologic studies, considering the size of the dam, its general condition and the downstream damage potential.

PHASE I INSPECTION REPORT

NATIONAL DAM SAFETY PROGRAM

SLEEPY VALLEY DAM, I.D. NJ00763

SECTION 1: PROJECT INFORMATION

1.1 General

a. Authority

Public Law 92-367, August 8, 1972, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a National Program of Dam Inspection throughout the United States. The Division of Water Resources of the New Jersey Department of Environmental Protection (NJDEP) in cooperation with the Philadelphia District of the Corps of Engineers has been assigned the responsibility of supervising the inspection of dams within the State of New Jersey. Storch Engineers has been retained by the NJDEP to inspect and report on a selected group of these dams. The NJDEP is under agreement with the Philadelphia District of the Corps of Engineers.

b. Purpose of Inspection

The visual inspection of Sleepy Valley Dam was made on January 29, 1981. The purpose of the inspection was to make a general assessment of the structural integrity and operational adequacy of the dam structure and its appurtenances.

1.2 Description of Project

a. Description of Dam and Appurtenances

The facilities at Sleepy Valley Dam consist of an earthfill dam with a spillway at the left end and outlet works near the center.

The spillway consists of timber flashboards resting on a concrete sill at the upstream side of a concrete structure consisting of two abutments and two piers forming three openings through the dam. A steel grate bridge spans the top of the structure. The spillway is a sharp crested weir with an effective length of 40 feet. The spillway crest elevation is 585.8, National Geodetic Vertical Datum (N.G.V.D) about 2.0 feet below the embankment crest.

The outlet works consist of a 12-inch cast iron pipe transversely penetrating the dam. The outlet pipe discharges at a concrete headwall at the toe of dam.

The earthfill embankment is approximately 270 feet long and extends approximately north to south. The embankment crest is about 10 feet wide. The downstream embankment slope is 2.5 horizontal to 1 vertical while the upstream face of the embankment has a slope of 1 horizontal to 1 vertical above the water line. Near the right end of dam, an earth roadway leads away from the downstream side of dam, thus providing vehicular access to the embankment. Between the outlet works and the earth roadway, the downstream face of dam consists of a stone rubble wall.

b. Location

Sleepy Valley Dam is located in the Township of Vernon, Sussex County, New Jersey. Constructed across a tributary to the Wallkill River, it impounds Sleepy Hollow Lake. The tributary joins the Wallkill River, approximately one mile downstream from the dam. Principal access to the dam is by local roads in the residential development known as Tall Timbers located off of Sussex-Glenwood Road (Route 565).

c. Size and Hazard Classification

The dam is classified in accordance with criteria presented in "Recommended Guidelines for Safety Inspection of Dams" published by the U.S. Army Corps of Engineers. Size categories consist of Small, Intermediate and Large while hazard categories are designated as Low, Significant and High.

Size Classification: Sleepy Valley Dam is classified as "Small" size since its maximum storage volume is 122 acre-feet (which is less than 1000 acre-feet) and its height is 13.4 feet (which is less than 40 feet).

Hazard Classification: Visual inspection of the downstream flood plain of the dam together with breach analysis indicate that failure of the dam due to overtopping would not inundate the two dwellings located adjacent to the downstream channel 300 and 700 feet respectively, from the dam, nor would it inundate the approximately four trailers located 300 feet downstream. Even though the impoundment forms a private recreational area loss of less than a few lives could be expected. The area upstream and downstream from the dam may have summer recreation uses. Loss of more than a few lives is not anticipated. Accordingly, Sleepy Valley Dam is classified as "Significant" Hazard.

d. Ownership

Sleepy Valley Dam is owned by the Tall Timbers Inc., R.D. #2, Box 488, Sussex, New Jersey 07461.

e. Purpose of Dam

The purpose of the dam is the impoundment of a recreational lake facility.

f. Design and Construction History

Information relating to the original construction of the dam was not available.

The dam was reconstructed in 1937 by John W. Heller, Contractor, of Maplewood, N.J.

g. Normal Operational Procedure

Reportedly, normal operation of the dam consists of lowering the lake level 2 feet on a periodic basis to facilitate beach repairs.

1.3 Pertinent Data

a. Drainage Area	1.51 square miles
b. Discharge at Damsite	
Maximum flood at damsite	Unknown
Outlet works at normal pool elevation	15 c.f.s
Spillway capacity at top of dam	390 c.f.s.

c. Elevation (N.G.V.D.)

Top of Dam	587.8
Maximum pool-design surcharge	588.9
Spillway crest	585.8
Streambed at toe line on dam	574.4
Maximum tailwater	580 (Estimated)

d. Reservoir Length

Length of maximum pool	1000 feet (estimated)
Length of recreation pool	900 feet (scaled)

e. Storage (Acre-feet)

Design surcharge	145
Recreation pool	81
Top of dam	122

f. Reservoir Surface (acres)

Design Surcharge	22.2 (Estimated)
Recreation pool	18.5
Top of dam	21.3 (Estimated)

g. Dam

Type	Earthfill
Length	270 feet
Height	13.4 feet
Sideslopes - Upstream	1 horiz. to 1 vert.
- Downstream	2.5 horiz. to 1 vert.
Zoning	Unknown
Impervious core	Concrete Core Wall
Cutoff	Unknown
Grout curtain	Unknown

h.	Diversion and Regulating Tunnel	N.A.
i.	Spillway	
	Type	Concrete Weir (fitted with timber flashboards)
	Length of weir	40 feet
	Crest elevation	585.8
	Approach channel	N.A.
	Discharge channel	Three rectangular sections thru dam formed by piers and abutments.

j. Regulating Outlet

One 12" dia. Cast Iron Pipe (Gate not observed)

SECTION 2: ENGINEERING DATA

2.1 Design

A construction drawing titled "Property of Sleepy Valley Inc." prepared by Schilling & Spinnler Inc., of Paterson, N.J. for the Sleepy Valley Inc., originally dated October 15, 1931, is available in the files of the NJDEP, Division of Water Resources. In addition, hydraulic/hydrologic design calculations and construction specifications are contained in the NJDEP file.

Design inflow, as contained in the NJDEP file, was based on South Jersey curve and was found to be 380 c.s.m. Spillway discharge capacity with 2.5 feet of head was found to be 430 c.s.m.

2.2 Construction

Sleepy Valley Dam was reconstructed in 1937 by John W. Heller, Contractor, of Maplewood, N.J.

Two inspections were performed by the State of New Jersey. The first, on October 19, 1931, stated that the site was suitable for the specified dam and spillway. During construction operations, on June 17, 1937, John W. Heller, contractor for the dam, contacted the State of New Jersey. Mr. Heller stated he could save the client money by raising the core wall and crest of spillway and by locating the spillway at the left end of the dam. The second and final inspection performed by the State of New Jersey confirmed the reported construction revisions, and approved the revisions, and indicated that the dam had been completed in accordance with the approved drawing.

In addition, dam applications, monthly progress reports and photos of the dam are contained in the NJDEP file.

2.3 Operation

Correspondence in the NJDEP file indicates State of New Jersey approval of the use of flashboards in the spillway "provided the top of the flashboard is not more than 8 inches above the crest of the concrete crest of the permanent spillway."

An inspection in 1969 by Anthony J. Barnish, P.E. indicated no need for repairs of an urgent or structural nature. However, the inspection report made recommendations for the repair of spalling of one of the concrete walls and the clearing of heavy plant growth. No documentation of the performance of these measures could be found.

2.4 Evaluation

a. Availability

Available engineering information is limited to that which is on file with the NJDEP.

b. Adequacy

The NJDEP file information was of significant assistance in the performance of a Phase I evaluation. However, complete information needed to properly evaluate the dam was not available. A list of absent information is included in paragraph 7.1.b.

c. Validity

The available hydraulic analyses are not valid according to analytic procedures developed by the Corps of Engineers for the present inspection and assessment program. Also, the use of a 2.5 foot head in the calculations appeared inconsistent with the design dimension of 2 feet.

The flashboards were found to be more than 8 inches above the concrete crest; however the opening above the flashboards was found to be 2 feet as required by the original design.

SECTION 3: VISUAL INSPECTION

3.1 Findings

a. General

Sleepy Valley Dam was inspected on January 29, 1981 by members of the staff of Storch Engineers. A copy of the visual inspection checklist is contained in Appendix 1. The following procedures were employed for the inspection:

1) The embankment of the dam, appurtenant structures and adjacent areas were examined.
2) The embankment and accessible appurtenant structures were measured and key elevations were determined by surveyor's level.
3) The embankment, appurtenant structures and adjacent areas were photographed.
4) The immediate downstream flood plain was toured to evaluate downstream development and restricting structures.

b. Dam

The downstream side of the embankment was overgrown with weeds, briars, bushes and a few small trees and a few stumps. The small trees were about one inch in size and the stumps about 12 to 24 inches. It appeared that the crest of the embankment was paved with asphalt. The asphalt appeared to be in generally satisfactory condition. Although most of the upstream side was obscured by snow, some riprap was observed on the upstream face of the dam to the left of the spillway. A portion of the downstream side of the embankment was formed by a stone rubble wall. The stone wall was somewhat irregular and appeared to begin at a point approximately 75 feet right of the right end of the spillway. That point appeared to mark a difference in embankment cross-section.

There was a raised portion, or bulge, in the crest of the embankment at a point corresponding to the low level outlet pipe. Also, the asphalt in this location appeared to be somewhat broken up. The raised area protruded above the crest by approximately 2 inches.

c. Appurtenant Structures

The concrete portions of the spillway structure appeared to be generally sound although there was some deterioration present as well. The right abutment had a vertical crack approximately 1/8 inch wide located at about the center. Its concrete surfaces were generally satisfactory. The left abutment appeared to be relatively recent concrete and was in generally satisfactory condition. The concrete weir at the upstream side that runs along the whole spillway upon which the timber flashboards rest appeared to be generally sound and in satisfactory condition. The timber flashboards were leaking along the seam between the top and bottom board and they appeared to be warped.

There are two concrete piers in the spillway. These piers are parallel to the abutments and form three segments of the spillway. The right pier was generally sound, but it had some deterioration at its upstream end near the flashboards. Some concrete was broken away and a reinforcing rod was exposed. The left pier exhibited the same kind of deterioration in the same relative location. The steel bridge appeared to be in satisfactory condition. However, a timber plank running along the downstream edge of the bridge had a broken section.

d. Outlet Works

The discharge end of the outlet works pipe could be observed. The outlet pipe discharges at a concrete headwall at the toe

of the dam. The concrete headwall appeared to be in satisfactory condition. A dislodged cast iron grate was observed lying adjacent to the headwall. At the time of inspection there was a very slight movement of water discharging from the pipe.

e. Seepage

There was a general wet area in the immediate vicinity of the headwall, downstream from the headwall. There was also evidence of some orange deposits in the water just downstream from the outlet pipe headwall. There was also seepage evident approximately 25 feet downstream from the toe of dam at a point approximately 100 feet right of the spillway. The seepage was in the form of a wet spongy area of ground. A slight amount of movement of water was observed in the wet area.

f. Reservoir Area

The impoundment formed by the dam is approximately 900 feet long with a width varying from 500 feet to 900 feet. A building related to the beach area was located on the left side of the reservoir. Also several dwellings were located along the shore. The perimeter of the reservoir appeared to be generally wooded with shore slopes of approximately 50 percent.

g. Downstream Channel

The downstream channel in the vicinity of the dam consisted of a natural stream with a bed formed of cobbles. It had banks ranging from 3 feet to 10 feet in height. The bank slopes were approximately 3 horizontal to 1 vertical. The surrounding flood plain was generally wooded. One dwelling and four trailers were located adjacent to the channel approximately 300 feet downstream. Also another dwelling was located adjacent to the channel approximately 700 feet downstream.

SECTION 4: OPERATIONAL PROCEDURES

4.1 Procedures

The level of water in Sleepy Valley Dam is regulated by discharge over the spillway of the dam. The outlet is not reported to be used during times of intense storms to augment the spillway capacity.

The lake level is lowered on a periodic basis a height of 2 feet by removing flashboards. The drawdown is for lake maintenance purposes.

4.2 Maintenance of the Dam

Reportedly, regular maintenance of the dam consists of cutting brush on the embankment in the Spring and Fall.

4.3 Maintenance of Operating Facilities

Reportedly, there is no program of regular maintenance of the operating facilities. Recent maintenance of the spillway consisted of the construction of a new abutment 3 years ago.

4.4 Description of Warning System

Reportedly, no formal warning system is in use at the present time.

4.5 Evaluation of Operational Adequacy

The operation of the dam has been adequate to the extent that the dam reportedly has not been overtopped.

Maintenance documentation is poor and maintenance has been inadequate in the following areas:

1) Trees and brush on embankment not removed.
2) Outlet works not functioning properly.
3) Spalled and deteriorated concrete and cracks on spillway training walls not repaired.
4) Broken plank on bridge not repaired.
5) Deteriorated riprap on the upstream embankment left of the spillway not repaired.

SECTION 5: HYDRAULIC/HYDROLOGIC

5.1 Evaluation of Features

a. Design Data

The quantity of storm water runoff that the spillway should be able to handle is based on the size and hazard classification of the dam. This runoff quantity called the spillway design flood (SDF) is described in terms of return frequency or Probable Maximum Flood (PMF) depending on the extent of the dam's size and potential hazard. According to the "Recommended Gudielines for Safety Inspection of Dams" published by the U.S. Army Corps of Engineers, the SDF for Sleepy Valley Dam falls in a range of 100-year frequency to 1/2 PMF. In this case, the low end of the range, 100-year frequency, is chosen since the factors used to select size and hazard classification are on the low side of their respective ranges.

The SDF inflow hydrograph for Sleepy Valley Dam (See Appendix 4) was calculated by the Soil Conservation Service triangular unit hydrograph method with the curvilinear transformation utilizing the HEC-1-DAM computer program.

General hydrologic characteristics used in this method were computed using USGS quadrangles. The drainage area contributing to the impoundment is 1.51 square miles. Most of the watershed is suburban and farm land. The SDF peak inflow was computed to be 1493 c.f.s.

The spillway discharge rates were computed by the use of a weir formulae appropriate for the configuration of the spillway. The total spillway discharge with lake level equal to the top of the dam was computed to be 390 c.f.s. The SDF was routed through the dam by use of the HEC-1-DAM computer program using

the modified Puls Method. In routing the SDF, it was found that the dam crest would be overtopped by a depth of 1.1 feet. Accordingly, the subject spillway is assessed as being inadequate in accordance with criteria developed by the U.S. Army Corps of Engineers.

A dam breach analysis was then performed using a trapezoidal breach section with bottom length of 100 feet and sideslopes of 1 horizontal to 1 vertical. The breach peak outflow was computed to be 4117 c.f.s. Dam breach computations are contained in Appendix 4.

The breach analysis indicates that dam failure from overtopping would not cause inundation of the two dwellings located 300 and 700 feet downstream from the dam nor would it cause inundation of the approximately four trailers located 300 feet downstream.

b. Experience Data

Reportedly Sleepy Valley Dam has not experienced overtopping since reconstruction in 1957.

c. Visual Observation

At the time of the field inspection there was no evidence of recent overtopping.

d. Overtopping Potential

As indicated in paragraph 5.1.a. a storm of magnitude equal to the SDF would cause overtopping of the dam by a depth of 1.1 feet over the crest of the dam. The spillway is capable of passing approximately 26 percent of the SDF with the lake level equal to the top of dam.

e. Drawdown Time

Reportedly, the lake has never been drawn down, therefore experience data is not available. Based on available information the calculated drawdown time (See Appendix 4) is approximately 6.8 days.

SECTION 6: STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability

a. Visual Observation

The dam appeared, at the time of inspection to be outwardly structurally sound with no evidence of embankment cracks or distress. Evidence of seepage was observed at two locations along the toe of dam, but did not appear to be an indication of immediate distress in the embankment.

b. Generalized Soils Description

The soils at Sleepy Valley Dam site are characterized by the glacial ground moraine overlying two bedrock formations, the Losee and the Pochuck, as shown on the Geologic Map of New Jersey. To the northwest, the thickness of the ground moraine diminishes. The ground moraine is composed of silt with coarse sand pebbles and boulders.

The valley extends to the northeast, where recent alluvium is found adjacent to the stream courses.

c. Design and Construction Data

The analysis of structural stability and construction data for the embankment are not available.

d. Operating Records

Operating records for the dam and appurtenances are not available.

e. Post Construction Changes

No significant post-construction changes to the dam or area around the dam were reported or observed.

f. Seismic Stability

Sleepy Valley Dam is located in Seismic Zone 1 as defined in "Recommended Guidelines for Safety Inspection of Dams," which is a zone of very low seismic activity. Experience indicates that dams in Seismic Zone 1 will have adequate stability under seismic loading conditions, if stable under static loading conditions. The dam appeared to be stable under static loading conditions at the time of inspection.

SECTION 7: ASSESSMENT AND RECOMMENDATIONS

7.1 Dam Assessment

a. Safety

Based on the hydraulic and hydrologic analyses outlined in Section 5 and Appendix 4, the spillway of Sleepy Valley Dam is assessed as being inadequate. The spillway is not able to pass the SDF without an overtopping of the dam.

The embankment appeared at the time of inspection, to be generally outwardly stable. Observed seepage at the toe was not considered to be evidence of immediate dam instability.

Some the absent data are as follows:

1) Description of fill material for embankment.
2) Soils report for the site.
3) Maintenance documentation.
4) Post-construction engineering reports

b. Adequacy of Information

Information sources for this study included: 1) field investigations, 2) data from the NJDEP file (dam inspection reports, correspondence and the "Application for Permit for Construction or Repair of Dam"), 3) original construction drawings for the dam, 4) USGS quadrangles and 5) consultation with representatives of Tall Timbers, Inc. The information is adequate for a Phase I Assessment as outlined in "Recommended Guidelines for Safety Inspection of Dams."

c. Necessity for Additional Data/Evaluation

The data available and the evaluations performed are considered to be sufficient to permit a Phase I assessment of Sleepy Valley Dam.

7.2 Recommendations

a. Remedial Measures

Based on hydraulic and hydrologic analyses outlined in paragraph 5.1.a, the spillway is considered to be inadequate. It is therefore recommended that a professional engineer experienced in the design and construction of dams be engaged in the near future to perform more accurate hydraulic and hydrologic analyses relating to spillway capacity. Based on the findings of these analyses, the need for and type of remedial measures should be determined and then implemented.

The owner should, in the near future, develop an emergency action plan together with an effective warning system outlining actions to be taken by the operator to minimize downstream effects of an emergency at the dam.

In addition, it is recommended that the following remedial measures be undertaken in the near future:

1) The ability to drain the lake should be investigated by an engineer experienced in the design and construction of dams. If the need for a low level outlet is determined, the outlet works should be restored to proper operational condition or replaced.

2) Trees and adverse vegetation on the embankment should be removed.

3) Spalled and deteriorated portions of the concrete piers and abutments should be repaired.

4) The timber flashboards should be repaired or replaced.

5) Deteriorated sections of riprap on the upstream face of the embankment to the left of the spillway should be renovated.

b. Maintenance

In the future, the owner of the dam should develop written operating procedures and a periodic maintenance plan to ensure the safety of the dam.

c. Additional Studies

Arrangements should be made in the near future to monitor the seepage on a periodic basis in order to detect any changes in its condition. The monitoring should be performed by a professional engineer experienced in the design and construction of dams.

PLATES

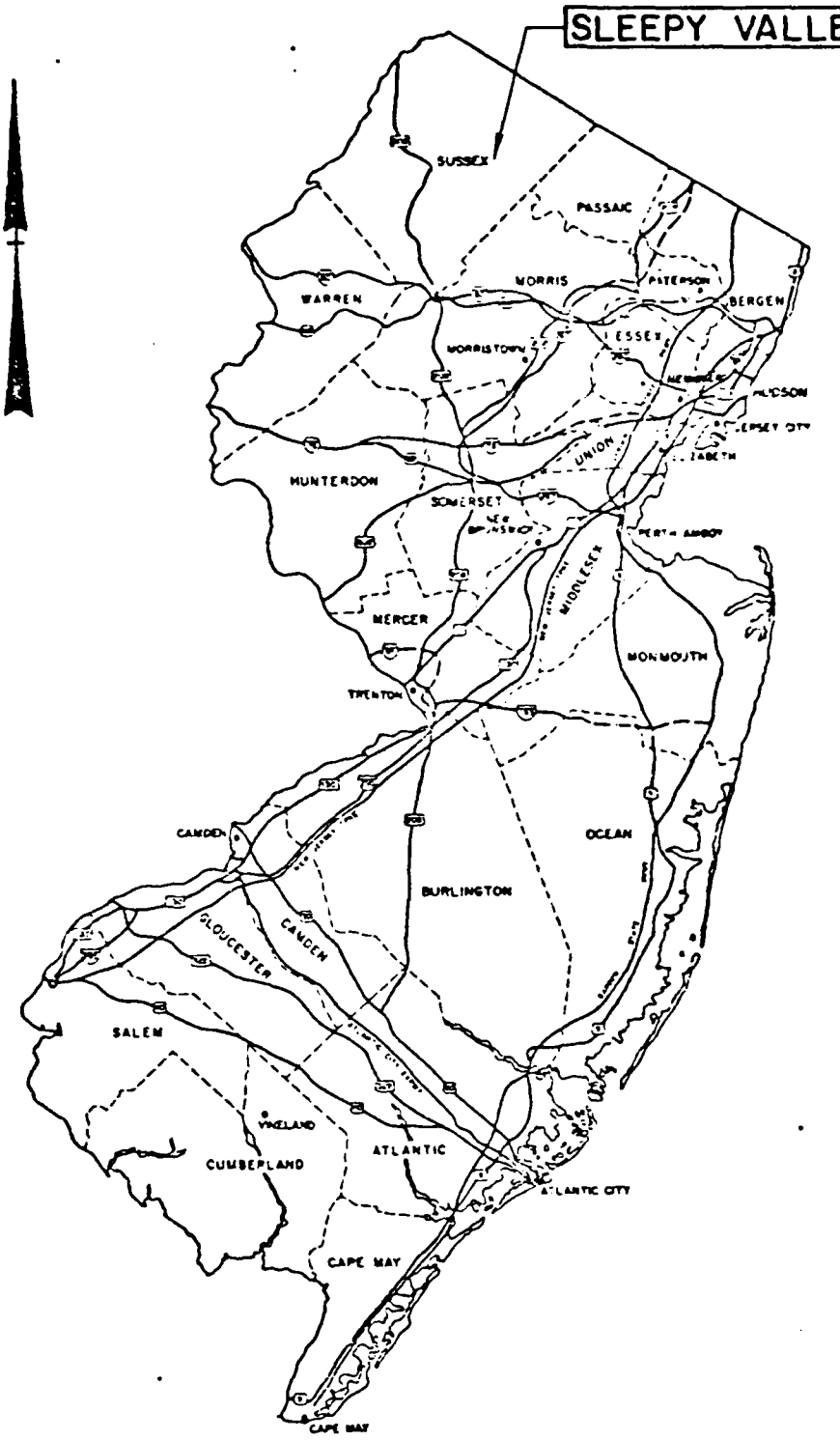


PLATE 1

STORCH ENGINEERS
FLORHAM PARK, NEW JERSEY

DIVISION OF WATER RESOURCES
N.J. DEPT. OF ENVIR. PROTECTION
TRENTON, NEW JERSEY

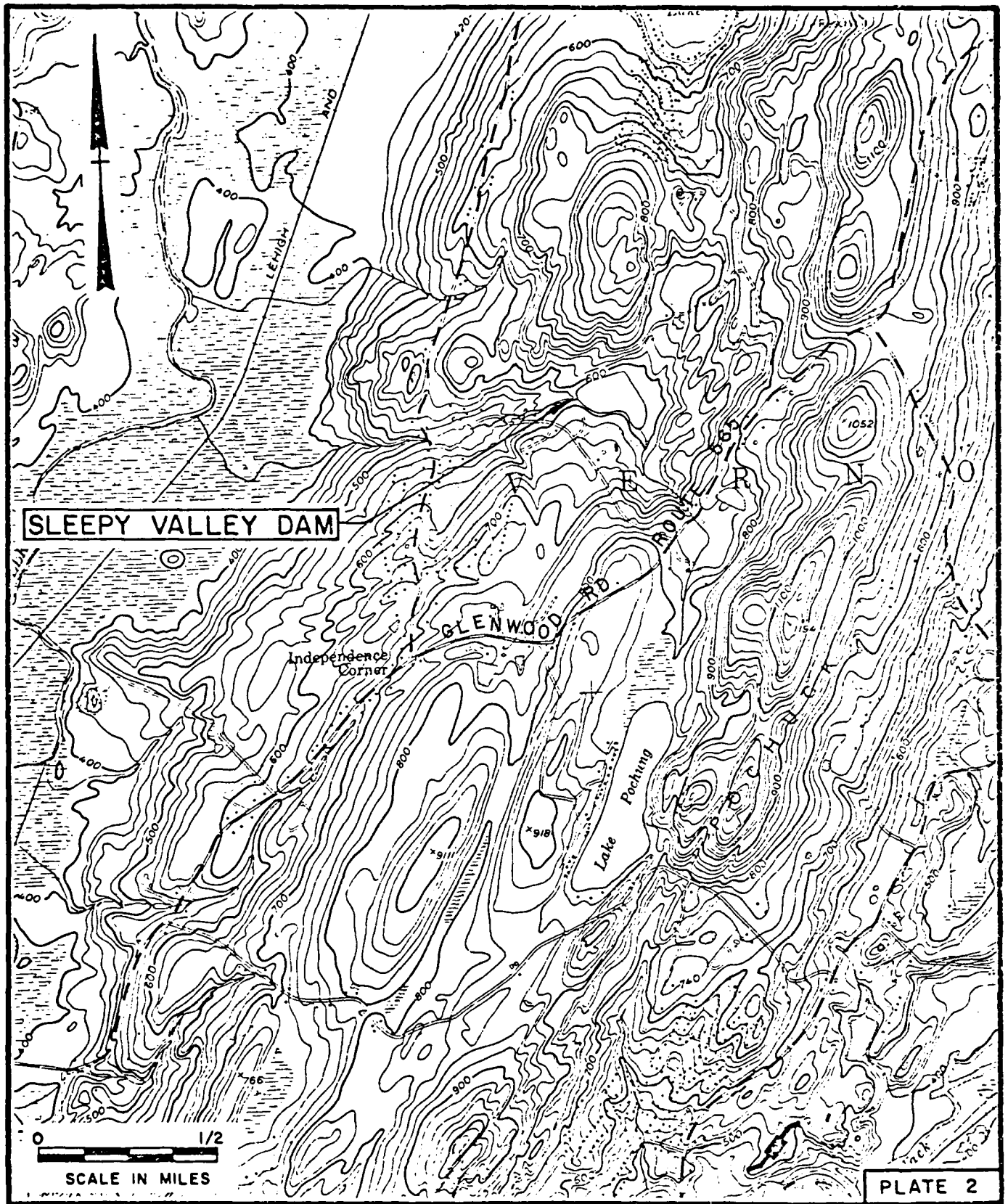
INSPECTION AND EVALUATION OF DAMS

KEY MAP

SLEEPY VALLEY DAM

SCALE: NONE

DATE: FEB. 1981



STORCH ENGINEERS
FLORHAM PARK, NEW JERSEY

DIVISION OF WATER RESOURCES
N.J. DEPT. OF ENVIR. PROTECTION
TRENTON, NEW JERSEY

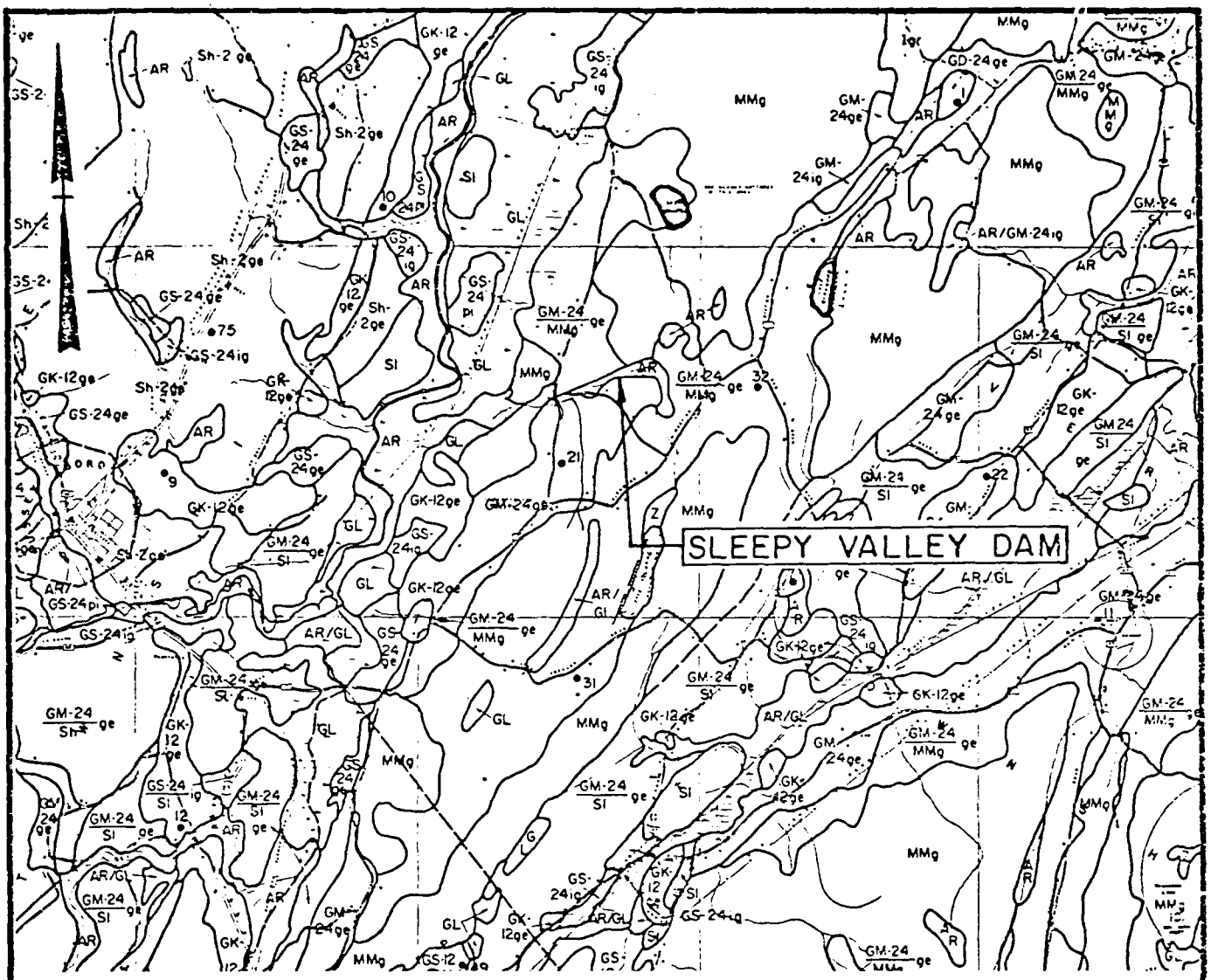
INSPECTION AND EVALUATION OF DAMS

VICINITY MAP

SLEEPY VALLEY DAM

SCALE: AS SHOWN

DATE: FEB. 1981



Legend

GM-24 — Glacial ground moraine. Composed of unconsolidated unstratified material deposited during the Wisconsin glacial state.

AR — Recent alluvium composed of stratified materials, found adjacent to the present stream courses.

Note: Information taken from Rutgers University, Soil Survey of New Jersey, Report No. 11, Sussex County, November 1953 and Geologic Map of New Jersey prepared by J.V. Lewis and H. Kummel 1910-1912, revised by H. B. Kummel 1931 and M. Johnson 1950.

PLATE 3

STORCH ENGINEERS
FLORHAM PARK, NEW JERSEY.

DIVISION OF WATER RESOURCES
N.J. DEPT. OF ENVIR. PROTECTION
TRENTON, NEW JERSEY

INSPECTION AND EVALUATION OF DAMS

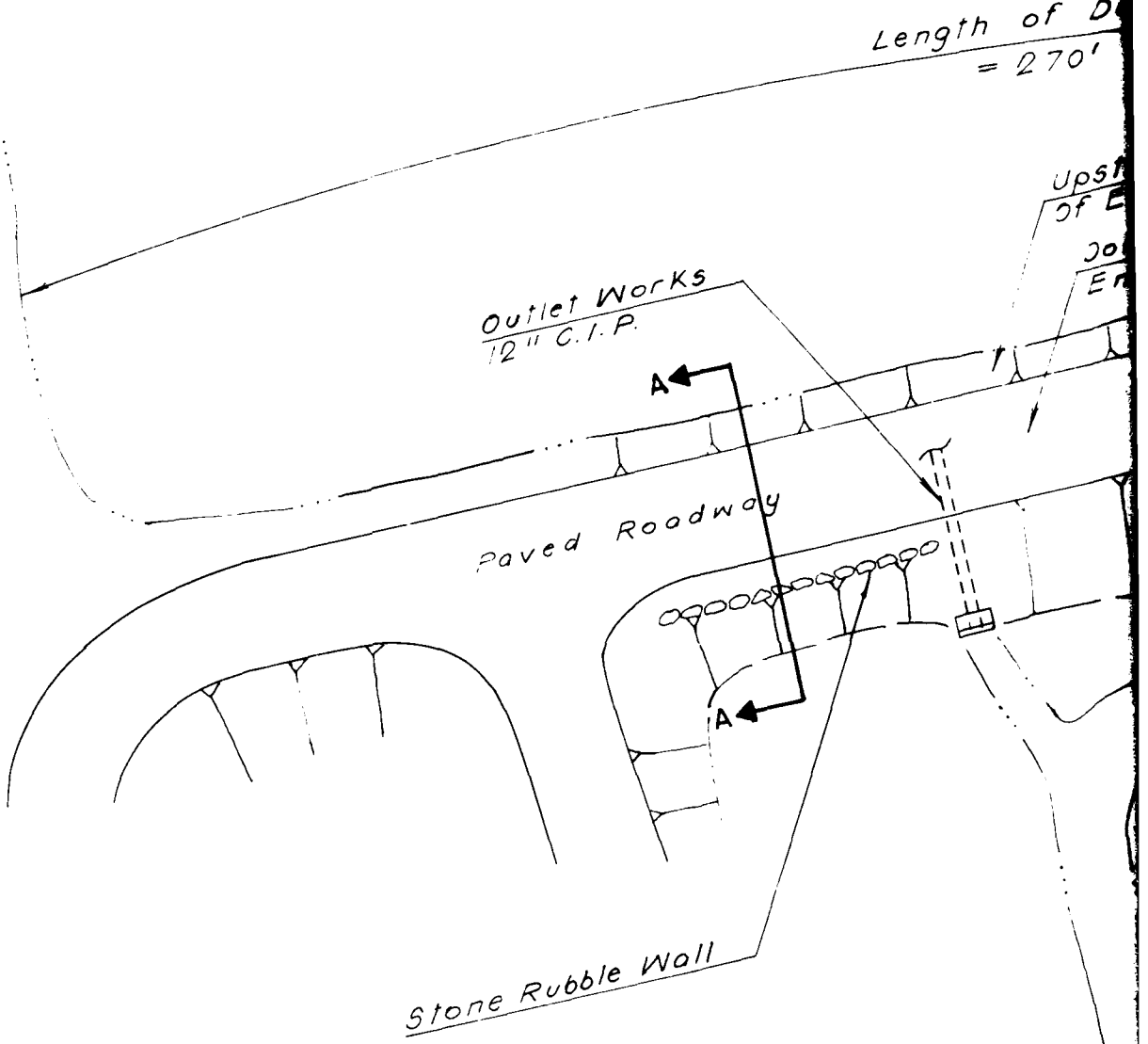
SOIL MAP

SLEEPY VALLEY DAM

SCALE: NONE

DATE: FEB.1981

SLEEPY


Length of D
= 270'
Outlet Works
12" C.I.P.
A
A
Paved Roadway
Stone Rubble Wall

EPY VALLEY LAKE

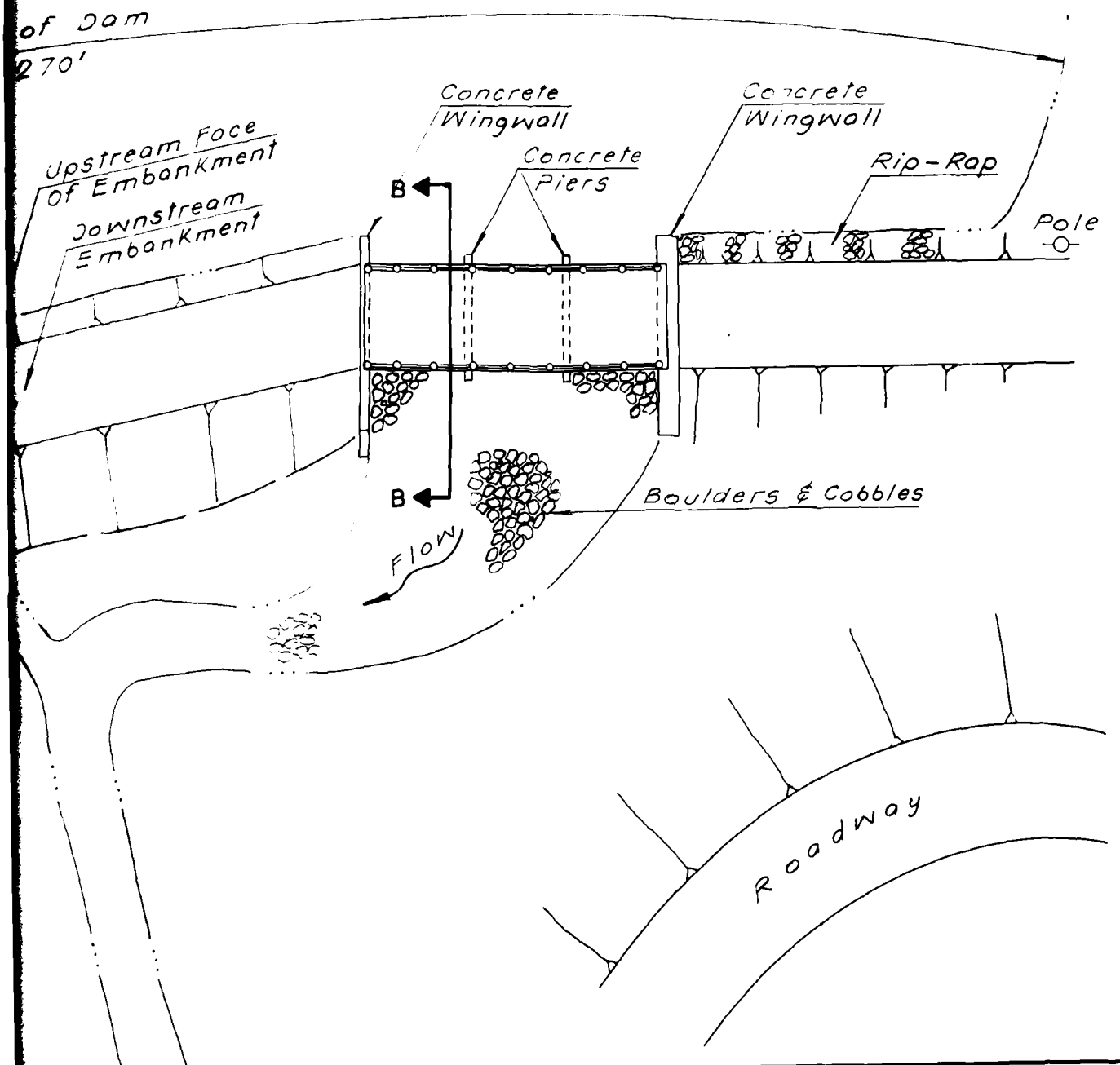


PLATE 4

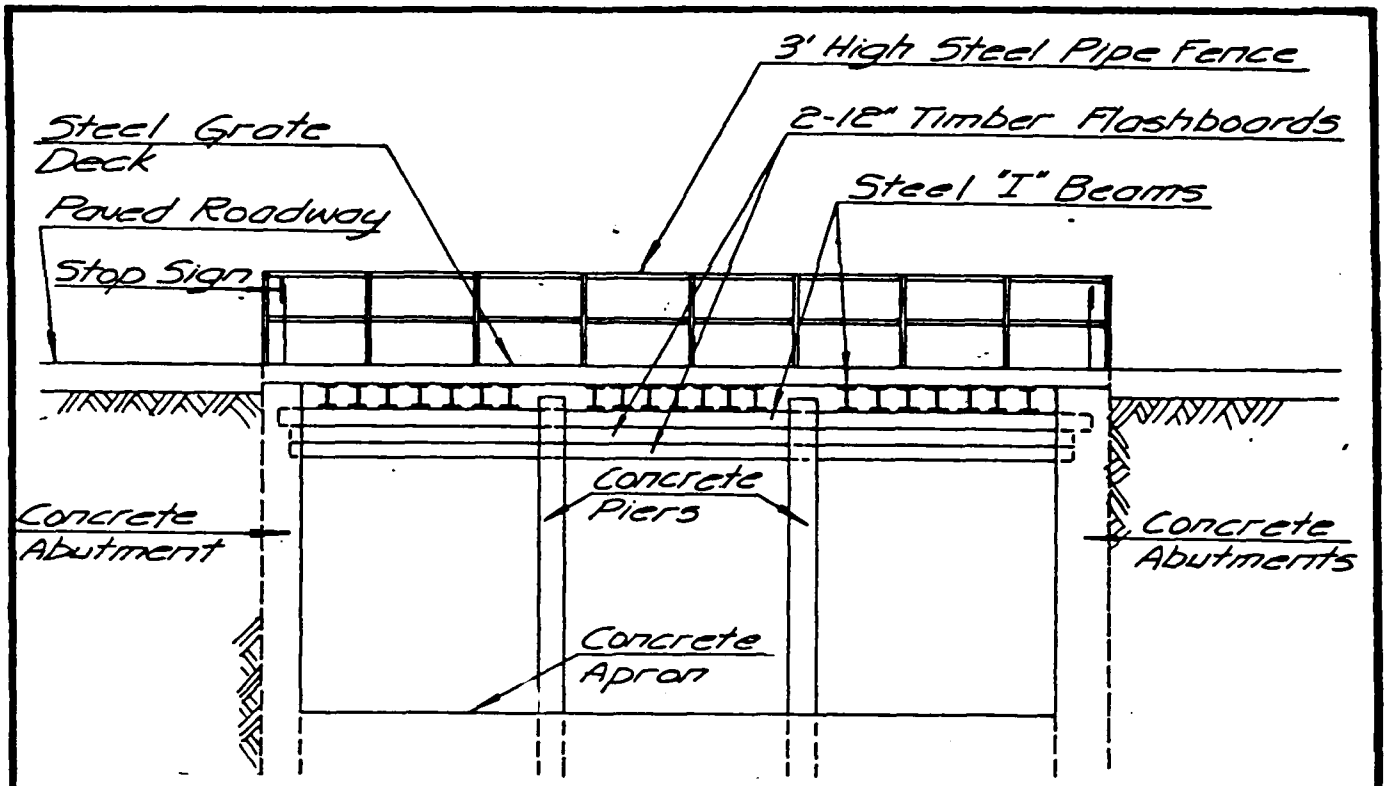
STORCH ENGINEERS FLORHAM PARK, NEW JERSEY	DIVISION OF WATER RESOURCES N.J. DEPT. OF ENVIR. PROTECTION TRENTON, NEW JERSEY

INSPECTION AND EVALUATION OF DAMS

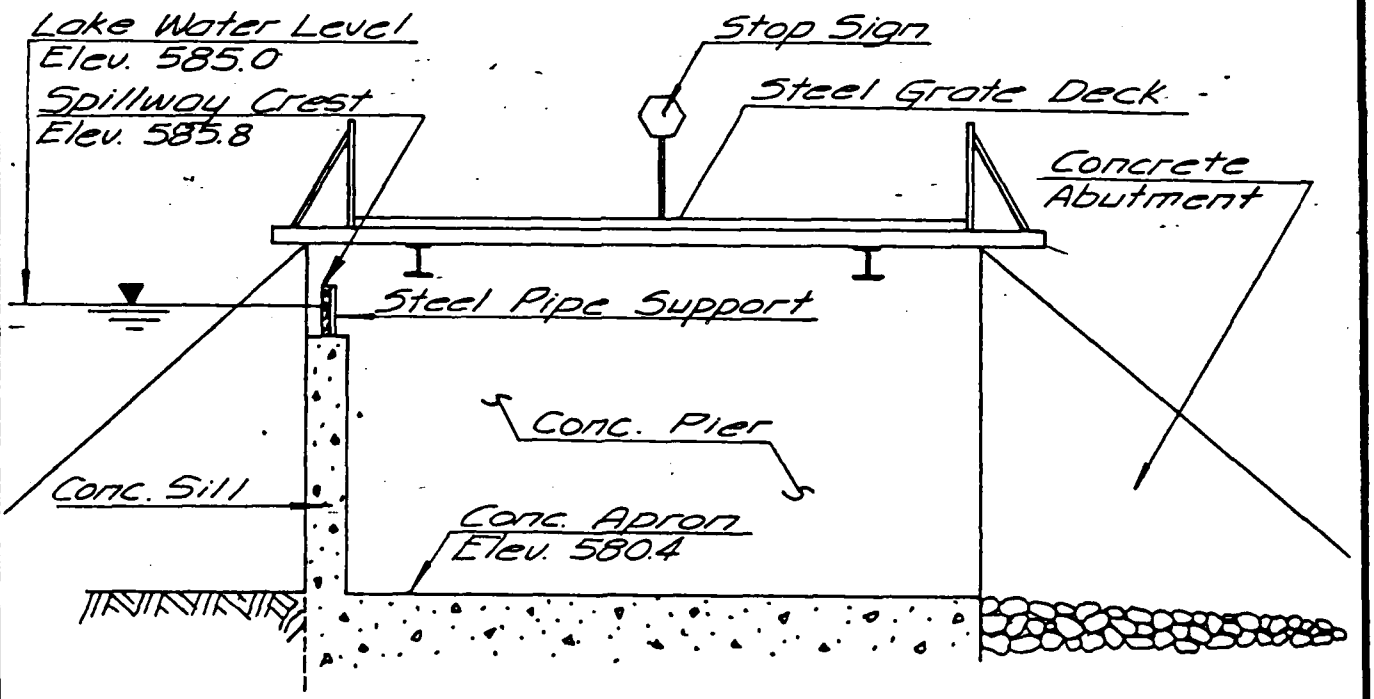
GENERAL PLAN

SLEEPY VALLEY LAKE DAM

I.D. N.J 00763	SCALE: NOT TO SCALE
	DATE: FEB. 1981



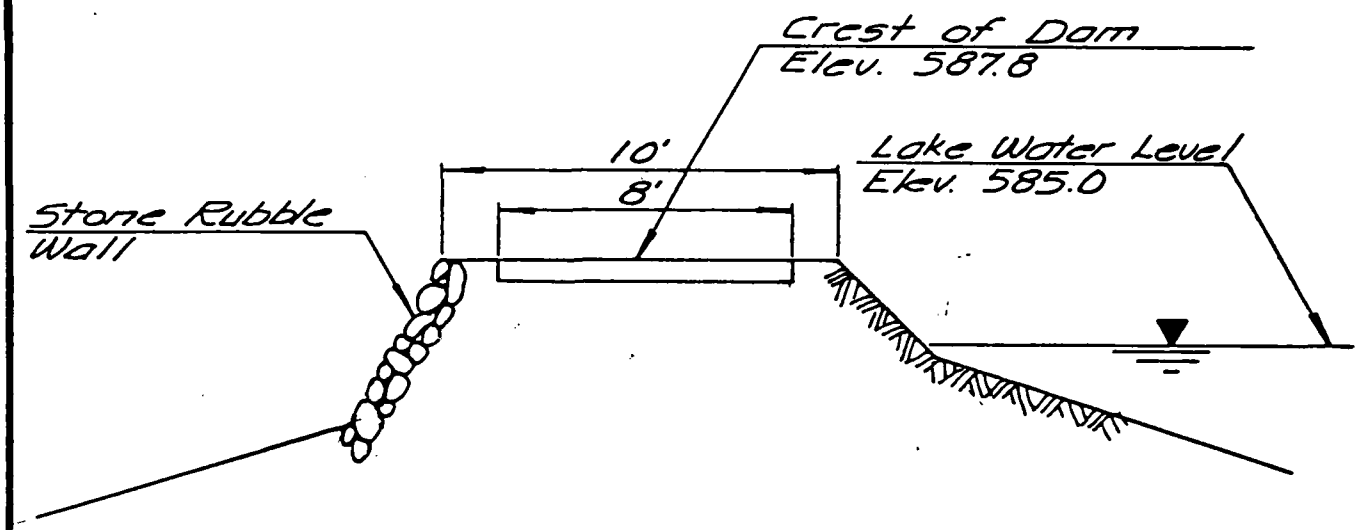
DOWNSTREAM ELEVATION



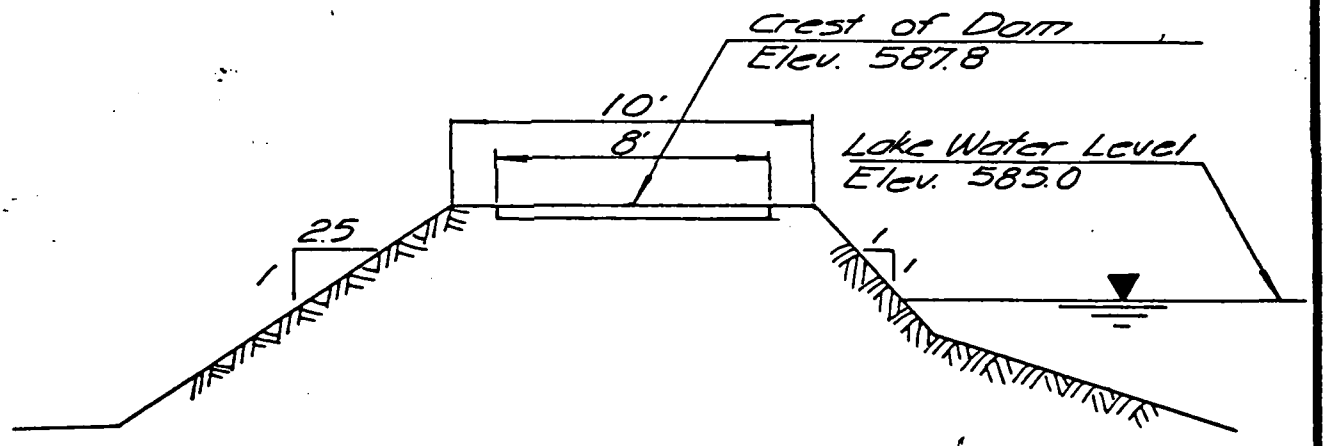
SPILLWAY SECTION

PLATE 5

STORCH ENGINEERS FLORHAM PARK, NEW JERSEY	INSPECTION AND EVALUATION OF DAMS SPILLWAY SLEEPY VALLEY LAKE DAM
DIVISION OF WATER RESOURCES N.J. DEPT. OF ENVIR. PROTECTION TRENTON, NEW JERSEY	I.D. N.J. 00763 — SCALE: NONE DATE: FEB, 1981



SECTION A-A

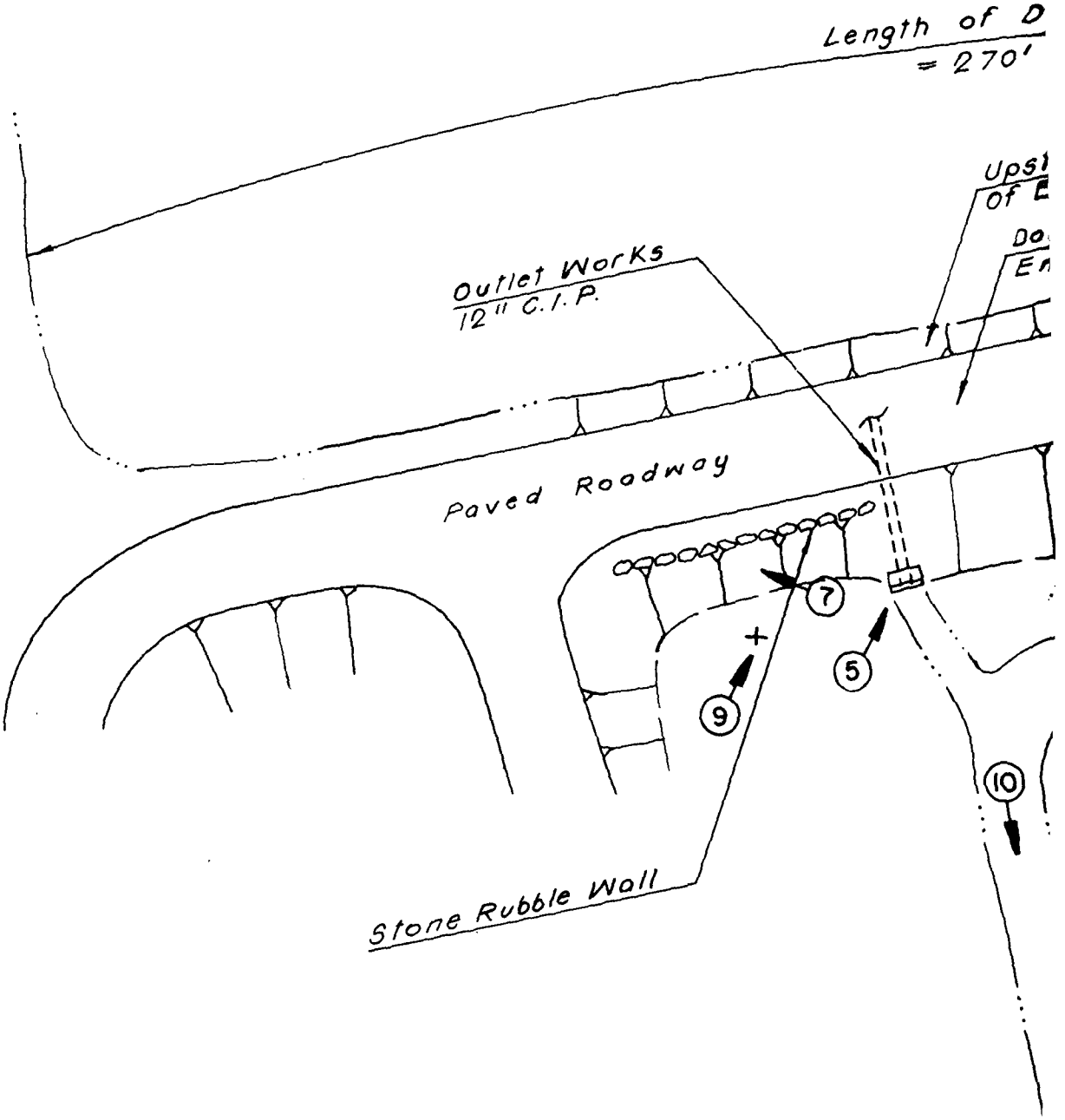


SECTION B-B

PLATE 6

STORCH ENGINEERS FLORHAM PARK, NEW JERSEY	INSPECTION AND EVALUATION OF DAMS DAM SECTIONS SLEEPY VALLEY LAKE DAM
DIVISION OF WATER RESOURCES N.J. DEPT. OF ENVIR. PROTECTION TRENTON, NEW JERSEY	I.D. N.J. 00763 / SCALE: NONE DATE: FEB, 1981

SLEEPY


Length of D
= 270'
Upst
of C
Do
En
Outlet Works
12" C.I.P.
Paved Roadway
7
5
9
10
Stone Rubble Wall

Y VALLEY LAKE

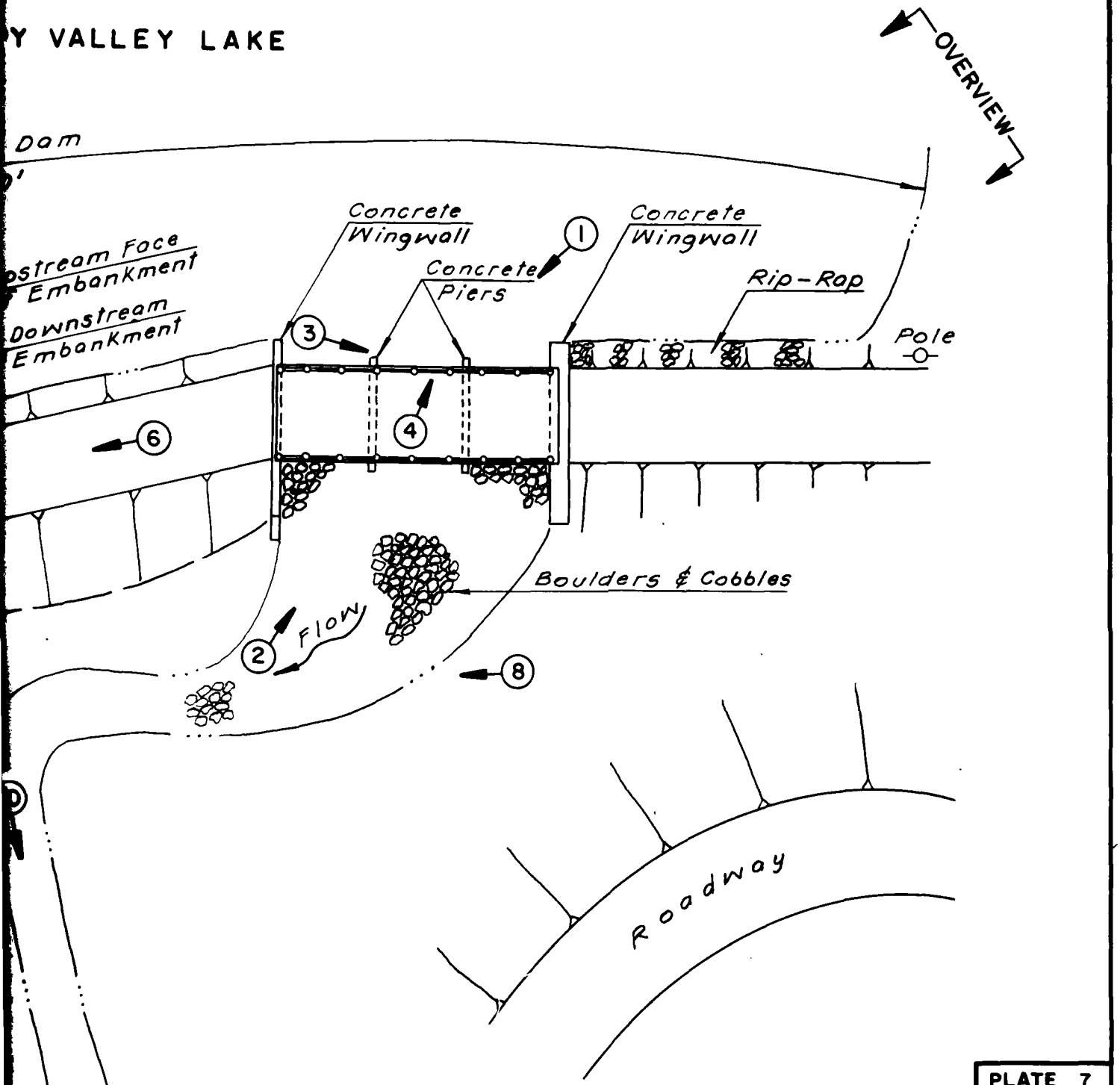


PLATE 7

STORCH ENGINEERS FLORHAM PARK, NEW JERSEY	DIVISION OF WATER RESOURCES N.J. DEPT. OF ENVIR. PROTECTION TRENTON, NEW JERSEY

INSPECTION AND EVALUATION OF DAMS

PHOTO LOCATION PLAN
SLEEPY VALLEY LAKE DAM

I.D. N.J. 00763	SCALE: NOT TO SCALE
	DATE: FEB. 1981

APPENDIX 1

Check List - Visual Inspection

Check List - Engineering Data

Check List

Visual Inspection

Phase I

Name of Dam Sleepy Valley Dam County Sussex State N.J. Coordinators NJDEP

Date(s) Inspection 1/29/81 Weather P. Sunny Temperature 25°F

Pool Elevation at time of Inspection 585.0 M.S.L. Tailwater at Time of Inspection 574.8 M.S.L.

Inspection Personnel:

John Gribbin Richard McDermott

John Powanda

Daniel Buckelew

John Gribbin Recorder

Owner's representative not present

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
GENERAL	Asphalt pavement on crest in generally satisfactory condition. Upstream side grass covered with a few bushes. Downstream side overgrown with bushes, briars, trees (about 1") and stumps (12" to 24"). Stone rubble wall forming portion of downstream face somewhat irregular and in fair condition.	Embankment obscured by snow. Trees and adverse vegetation should be removed.
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	Appeared sound.	
ANY NOTICEABLE SEEPAGE	Seepage observed at two locations downstream from the toe. 1. A wet area about 25' downstream from toe about 100' right of the spillway. Water flowing with a trickle. 2. A wet area containing orange colored deposits downstream from the discharge end of the outlet pipe.	Seepage should be monitored.
STAFF GAGE AND RECORDER	None observed.	
DRAINS	None observed.	

EMBANKMENT

VISUAL EXAMINATION	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	None observed.	
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	None observed.	
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	None observed.	
VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST	Vertical: Generally level with localized raised portion of crest (about 0.2' high) at approx. location of outlet works. Horizontal: Generally straight but at slight angle with alignment of spillway.	
RIPRAP	Riprap observed on upstream face left of spillway (8" to 12" stones). Coverage did not appear to be adequate for slope protection.	Riprap should be renovated.

OUTLET WORKS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE SURFACES IN OUTLET CONDUIT	Conduit is cast iron pipe. Concrete headwall, in satisfactory condition, observed at discharge end. Cast iron grate displaced from discharge end.	Outlet works should be restored or replaced.
INTAKE STRUCTURE	Not observed.	
OUTLET STRUCTURE	Concrete headwall described above.	
OUTLET CHANNEL	Natural stream flowing to spillway downstream channel.	
GATE AND GATE HOUSING	Not observed.	Sound of leaking water could be heard at discharge end. Slight movement of water discharging from end of pipe.

SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
WEIR	Three sets of timber flashboards rest on concrete weir, or sill. Concrete in satisfactory condition. Flashboards appeared to be slightly warped and leaking.	Flashboards should be repaired or replaced.
ABUTMENTS	Concrete generally sound. Vertical crack, 1/8" wide, observed at center of right abutment.	Abutments and piers form vertical sides of three spillway discharge channels through dam.
PIERS	Concrete generally sound with some deterioration at upstream end adjacent to flashboards. Some concrete broken off and reinforcing rod exposed.	Spalled and deteriorated portions of the concrete piers and abutments should be repaired.
APRON	Concrete apron forming bottom of discharge channels appeared sound and slightly eroded from discharge.	
WALKWAY	Steel grate walkway spanning three discharge channels appeared to be in generally satisfactory condition. Timber plank running along downstream edge of walkway had broken section.	

INSTRUMENTATION

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
MONUMENTATION/SURVEYS	None observed.	
OBSERVATION WELLS	None observed.	
WEIRS	None observed	
PIEZOMETERS	None observed	
OTHER		

RESERVOIR

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	Shore slopes wooded and steep, about 50% grade, or greater.	
SEDIMENTATION	Unknown.	
STRUCTURES ALONG BANKS	Building related to swimming area located on left shore near dam. Some dwellings located along lake greater than 10' above water level.	

DOWNSTREAM CHANNEL

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTION, DEBRIS, ETC.)	Natural stream with cobble bottom and wooded flood plain.	
SLOPES	Bank slopes approx. 3 horiz. to 1 vert. and about 3' to 10' high.	
STRUCTURES ALONG BANKS	About four trailers adjacent to channel about 300' downstream. Dwellings located 300' and 700' downstream.	

CHECK LIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION

ITEM			REMARKS
DAM	-	PLAN	Available: Plans titled "Property of Sleepy Valley Inc." prepared by Schilling & Spinnler Inc., dated October 15, 1931, in NJDEP files NJDEP, Division of Water Resources, P.O. Box CN-029, Trenton, New Jersey
		SECTIONS	
SPILLWAY	-	PLAN	Available: Schilling & Spinnler plans.
		SECTIONS	
		DETAILS	
OPERATING EQUIPMENT PLANS & DETAILS			Available
OUTLETS	-	PLAN	Available: Schilling & Spinnler plans
		DETAILS	Not Available
		CONSTRAINTS	Not Available
		DISCHARGE RATINGS	Not Available
HYDRAULIC/HYDROLOGIC DATA			Available in NJDEP file
RAINFALL/RESERVOIR RECORDS			Not Available
CONSTRUCTION HISTORY			Available: correspondence, inspection reports and monthly progress reports in NJDEP file.
LOCATION MAP			Not Available

ITEM	REMARKS
DESIGN REPORTS	Not Available
GEOLOGY REPORTS	Not Available
DESIGN COMPUTATIONS	Available: Hand written calculations in NJDEP file
HYDROLOGY & HYDRAULICS	
DAM INSTABILITY	Not Available
SEEPAGE STUDIES	Not Available
MATERIALS INVESTIGATIONS	Not Available
BORING RECORDS	
LABORATORY	
FIELD	
POST-CONSTRUCTION SURVEYS OF DAM	Not Available
BORROW SOURCES	Not Available

ITEM	REMARKS
MONITORING SYSTEMS	Not Available
MODIFICATIONS	Correspondence in NJDEP file refers to change in location of spillway from center of dam to left end. This change appeared to have been constructed.
HIGH POOL RECORDS	Not Available
POST CONSTRUCTION ENGINEERING STUDIES AND REPORTS	Not Available
PRIOR ACCIDENTS OR FAILURE OF DAM DESCRIPTION REPORTS	Not Available
MAINTENANCE OPERATION RECORDS	Not Available

APPENDIX 2

Photographs

PHOTO 1
SPILLWAY - UPSTREAM VIEW

PHOTO 2
SPILLWAY - DOWNSTREAM VIEW

SLEEPY VALLEY DAM
29 JANUARY 1981

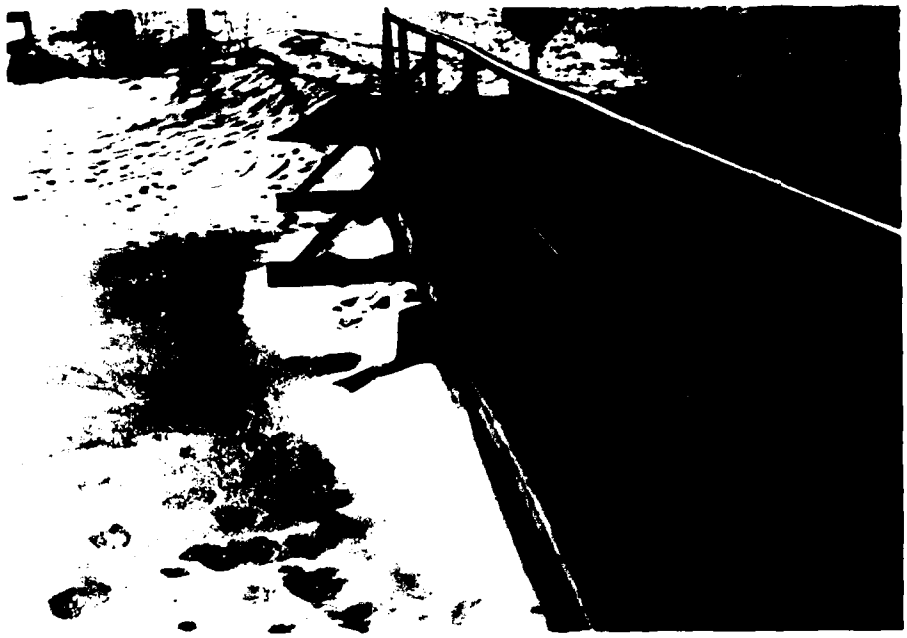


PHOTO 3

CREST OF SPILLWAY - TIMBER FLASHBOARDS

PHOTO 4

DOWNSTREAM SIDE OF FLASHBOARDS

SLEEPY VALLEY DAM

29 JANUARY 1981

PHOTO 5
DISCHARGE END OF OUTLET WORKS

PHOTO 6
CREST OF DAM

SLEEPY VALLEY DAM
29 JANUARY 1981

PHOTO 7
STONE RUBBLE WALL ON DOWNSTREAM FACE OF DAM

PHOTO 8
SPILLWAY DISCHARGE CHANNEL AND DOWNSTREAM FACE OF DAM

SLEEPY VALLEY DAM
29 JANUARY 1981

PHOTO 9
SEEPAGE AT TOE OF DAM

PHOTO 10
DOWNSTREAM CHANNEL

SLEEPY VALLEY DAM
29 JANUARY 1981

APPENDIX 3

Engineering Data

CHECK LIST

HYDROLOGIC AND HYDRAULIC DATA

ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: Suburban and farmland

ELEVATION TOP NORMAL POOL (STORAGE CAPACITY): 585.8 (81 acre-feet)

ELEVATION TOP FLOOD CONTROL POOL (STORAGE CAPACITY): N.A.

ELEVATION MAXIMUM DESIGN POOL: 588.9

ELEVATION TOP DAM: 587.8

SPILLWAY CREST:

a. Elevation 585.8

b. Type Timber flashboards

c. Width 0.2'

d. Length 40'

e. Location Spillover Upstream side of dam

f. Number and Type of Gates Three sets of flashboards

OUTLET WORKS:

a. Type Low level 12-inch cast iron pipe

b. Location Near center of dam

c. Entrance Invert unknown

d. Exit Invert 574.4

e. Emergency Draindown Facilities: None (location of gate unknown)

HYDOMETEOROLOGICAL GAGES: None

a. Type N.A.

b. Location N.A.

c. Records N.A.

MAXIMUM NON-DAMAGING DISCHARGE:

(Lake Stage Equal to Top of Dam) 390 c.f.s.

APPENDIX 4

Hydraulic/Hydrologic Computations

HYDROLOGY

HYDROLOGIC ANALYSIS- RUNOFF HYDROGRAPH WILL BE DEVELOPED BY THE HEC-1-DAM COMPUTER PROGRAM USING THE SCS TRIANGULAR HYDROGRAPH WITH CURVILINEAR TRANSFORMATION.

DRAINAGE AREA = 1.51 SQ. MI.

INFILTRATION DATA

INITIAL INFILTRATION = 1.5 inches

CONSTANT INFILTRATION 0.15 inches/hour

TIME OF CONCENTRATION

1) SCS-TR55.

OVERLAND FLOW:

$L = 6000'$
Δ ELEV = 240'
$S = 0.04$
$V = 0.5$ f.p.s.
$T_c =$ 3.33 HR.

TIME OF CONCENTRATION (con't.)

1) SCS-TR55

CHANNEL FLOW:

L= 2100'
Δ ELEV = 60'
S= 0.0285
V = 3.3 f.p.s.
T_c = 0.18 HR.

L= 1700'
Δ ELEV. = 140'
S= 0.082
V= 5.6 f.p.s.
T_c = 0.08 HR.
3.59 HR.

2) BY KERBY HANDBOOK OF HYDROLOGY BY CHOW

$$T_c = \sqrt[2.14]{2/3\ Ln/\sqrt{S}}$$

where: L= length of flow (ft.)
S = Slope
n = Mannings Coeff. of Roughness
T_c = Time of Concentration (min.)

TIME OF CONCENTRATION (con't.)

2) OVERLAND FLOW:

L = 6000'
S = 0.04
n = 0.4
T_c = 1.11 HR.

CHANNEL FLOW:

L = 2100'
S = 0.0285
n = 0.40
T_c = 0.74 HR.

L = 1700'
S = 0.082
n = 0.40
T_c = 0.52 HR.

2.37 HR.

3) N.J. HIGHWAY NOMOGRAPH

OVERLAND FLOW:

L = 6000'
S = 0.04
Avg. Grass
T_c = 0.92 HR.

TIME OF CONCENTRATION (con't.)

4) D.E.P. NOMOGRAPH

CHANNEL FLOW:

L = 2100'
ΔELEV. = 60'
T_c = 0.19 HR.

L = 1700'
ΔELEV. 140'
T_c = 0.10 HR.

1.21 HR.

5) S.C.S. NOMOGRAPH "DESIGN OF SMALL DAMS" U.S. DEPT. OF INTERIOR P. 71

$$T_c = \left(\frac{11.9L^3}{H}\right)^{0.385}$$

where L = length of watercourse (mi.)
H = Δ Elev.
T_c = time of Concentration (hr.)

OVERLAND FLOW:

L = 6000'
H = 240'
T_c = 0.45 HR.

TIME OF CONCENTRATION (con't.)

5) CHANNEL FLOW:
L = 2100'
H = 60'
T_c = 0.20 HR.

L = 1700'
H = 140'
T_c = 0.10 HR.
0.75 HR.

6) TEXAS HIGHWAY DEPT. "DESIGN OF SMALL DAMS"
U.S. DEPT. OF INTERIOR P. 70

OVERLAND FLOW: L = 6000', S = 0.04, V = 2.0 f.p.s.
T_c = 0.83 HR.

NAVDOCKS TP-PW-5 "DESIGN OF SMALL DAMS"
U.S. DEPT. OF INTERIOR P. 70

CHANNEL FLOW: L = 2100, S = 0.0285, V = 3.0 f.p.s.
T_c = 0.19 HR.

CHANNEL FLOW: L = 1700, S = 0.082, V = 5.0 f.p.s.

T_c = 0.095
1.14 HR.

STORCH ENGINEERS

Sheet 6 of 16

Project SLEEPY VALLEY DAM

Made By JLP Date 3-19-81

Chkd By JG Date 3/23/81

FOR COMPUTER INPUT USE:

T_c = 2.1 HR.

LAG TIME = $0.6\ T_c$ = 1.26 HR.

STORCH ENGINEERS

Sheet 1 of 16

Project SLEEPY VALLEY DAM

Made By JLP Date 3-19-81

Chkd By JG Date 3/23/81

PRECIPITATION

24 HOUR, 100-YEAR RAINSTORM

DISTRIBUTION FOR SLEEPY VALLEY DAM

TIME (HR.)	RAIN (inches)
1	0.075
2	0.075
3	0.075
4	0.075
5	0.075
6	0.075
7	0.075
8	0.075
9	0.075
10	0.075
11	0.075
12	0.075
13	0.15
14	0.15
15	0.15
16	0.33
17	0.65
18	3.00
19	0.65
20	0.33
21	0.33
22	0.15
23	0.15
24	0.15

LAKE STORAGE VOLUME

ELEVATION	AREA (ACRES)
574.4	0
585	18.5
600	39.7
620	52.9

HEC-1-DAM COMPUTER PROGRAM WILL DEVELOP STORAGE CAPACITY FROM SURFACE AREAS AND ELEVATIONS.

INFORMATION TAKEN FROM USGS QUADRANGLE HAMBURG, N.J.

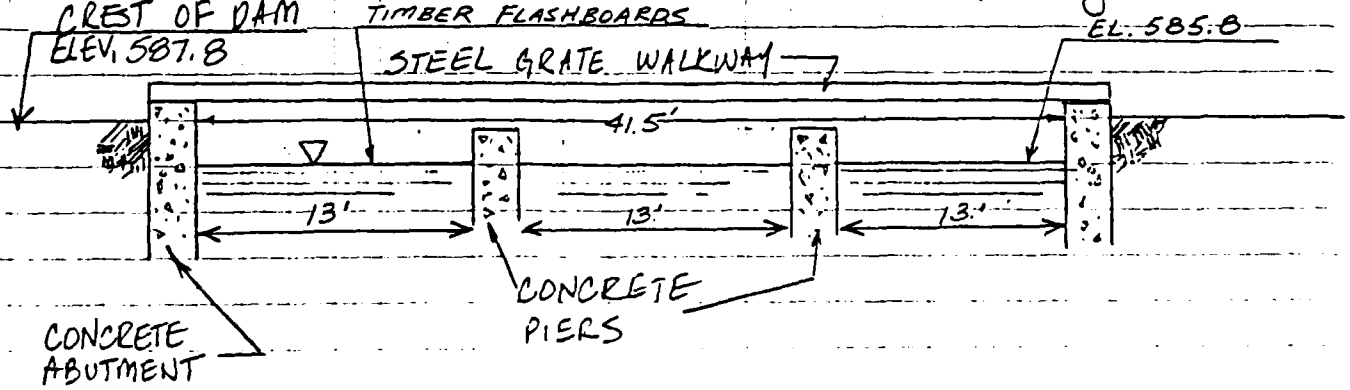
HYDRAULICS

THE SPILLWAY AT SLEEPY VALLEY DAM CONSISTS OF 3 SETS OF TIMBER FLASHBOARDS FITED BETWEEN CONCRETE PIERS AND ABUTMENTS. A STEEL GRATE WALKWAY IS LOCATED ACROSS THE TOP. THE FLASHBOARDS REST UPON A CONCRETE SILL WHICH RUNS ALONG THE WHOLE SPILLWAY.

DISCHARGE Q, CAN BE CALCULATED BY:

$$Q = CLH^{3/2}$$

where: Q = discharge over the spillway (cfs)
C = Spillway Coefficient
L = effective length of spillway (ft.)
H = total head on spillway (ft.)



NOTE: The effect of the steel grate walkway was not included in this hydraulic analysis

SPILLWAY STAGE DISCHARGE TABULATION

ELEV.	H (ft)	C	L (ft)	Q (cfs)
585.8	0	3.4	40	0.0
586.0	0.2	3.4	40	41
587.0	1.2	3.4	40	181
587.8	2.0	3.4	40	390
588.0	2.2	3.4	40	450
589.0	3.2	3.4	40	789
590.0	4.2	3.4	40	1186
592.0	6.2	3.4	40	2127
594.0	8.2	3.4	40	3235
596.0	10.2	3.4	40	4488

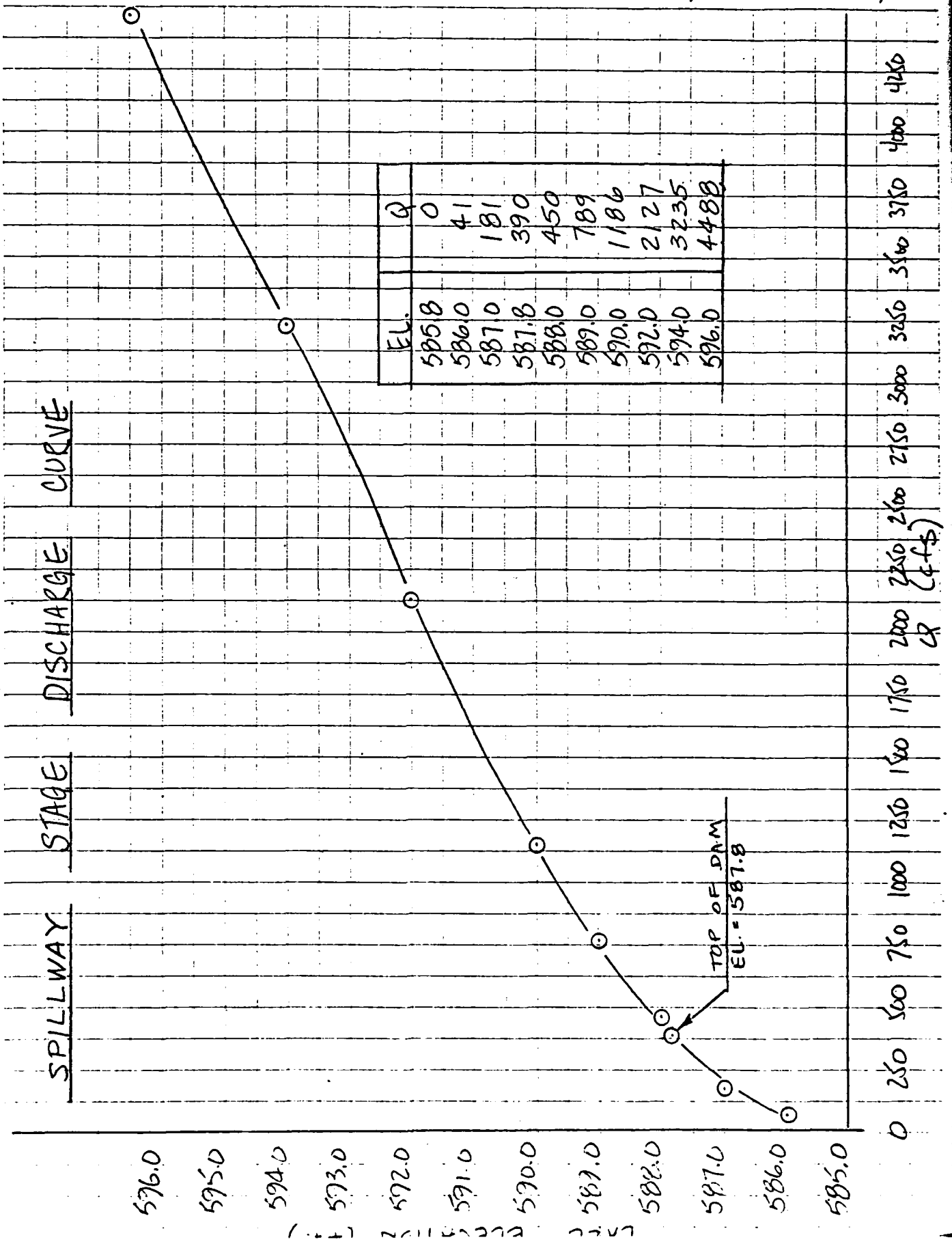
STORCH ENGINEERS

Sheet 11 of 16

Project SLEEPY VALLEY DAM

Made By JLP Date 3-20-81

Chkd By JG Date 3/23/81



EL.	Q
586.8	0
586.0	41
587.0	181
587.8	390
588.0	450
589.0	789
590.0	1186
592.0	2127
594.0	3235
596.0	4488

DRAWDOWN

Outlet works consist of a 12" C.M.P.

Discharge Q, is computed by using the "Hydraulic Charts for the Selection of Highway Culverts," Bureau of Public Roads, 1963 assuming inlet control.

Maximum discharge, HW = 11.4'

Q = 15 cfs

Average discharge, HW = 5.7'

Q = 7.5 cfs

Drawdown

$$\text{Drawdown time} = \frac{\text{Storage at Spillway}}{\text{Avg. Discharge} - \text{Avg. Inflow}}$$

$$= \frac{81 \text{ acre-feet} \times 43560 \text{ sq. ft./acre}}{(7.5 - 1.5) \text{ cfs} \times 3600 \text{ sec./hr.}}$$

$$= 6.8 \text{ DAYS}$$

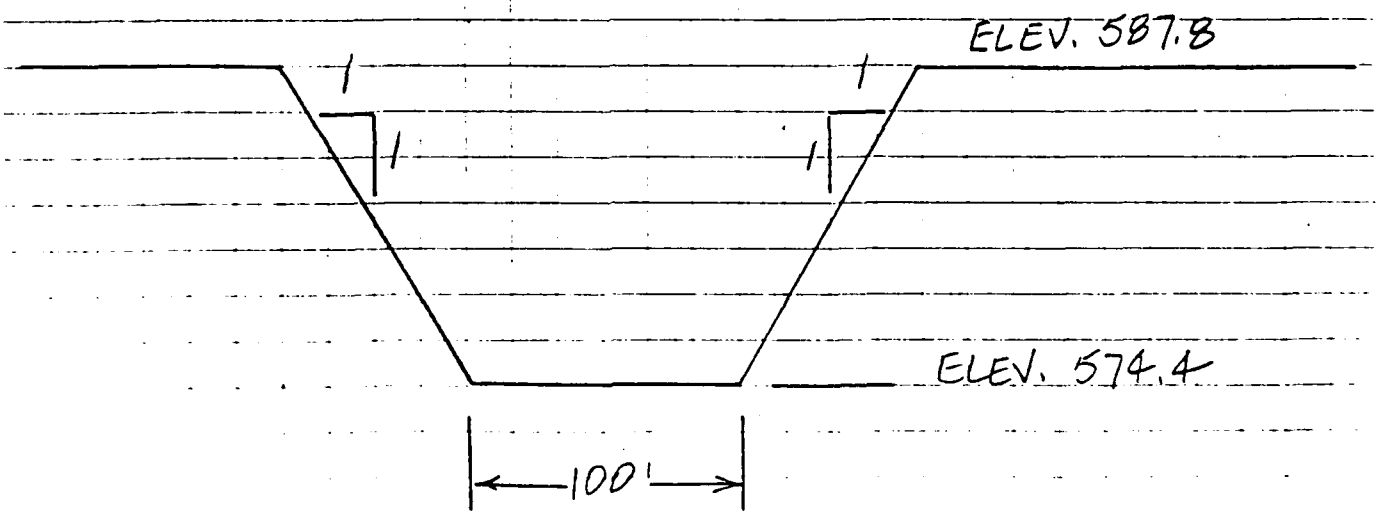
BREACH ANALYSIS

A BREACH HYDROGRAPH WILL BE COMPUTED BY THE HEC-1-DAM PROGRAM AND ROUTED THROUGH TWO DOWNSTREAM REACHES BY THE MODIFIED PULS METHOD. THE ASSUMED BREACH CONDITIONS ARE AS FOLLOWS:

1. THE BREACH BEGINS WHEN THE WATER SURFACE ELEVATION REACHES 587.8.

2. TIME TO DEVELOP BREACH = 1.0 HR.

3. SECTION:



FULLY DEVELOPED BREACH

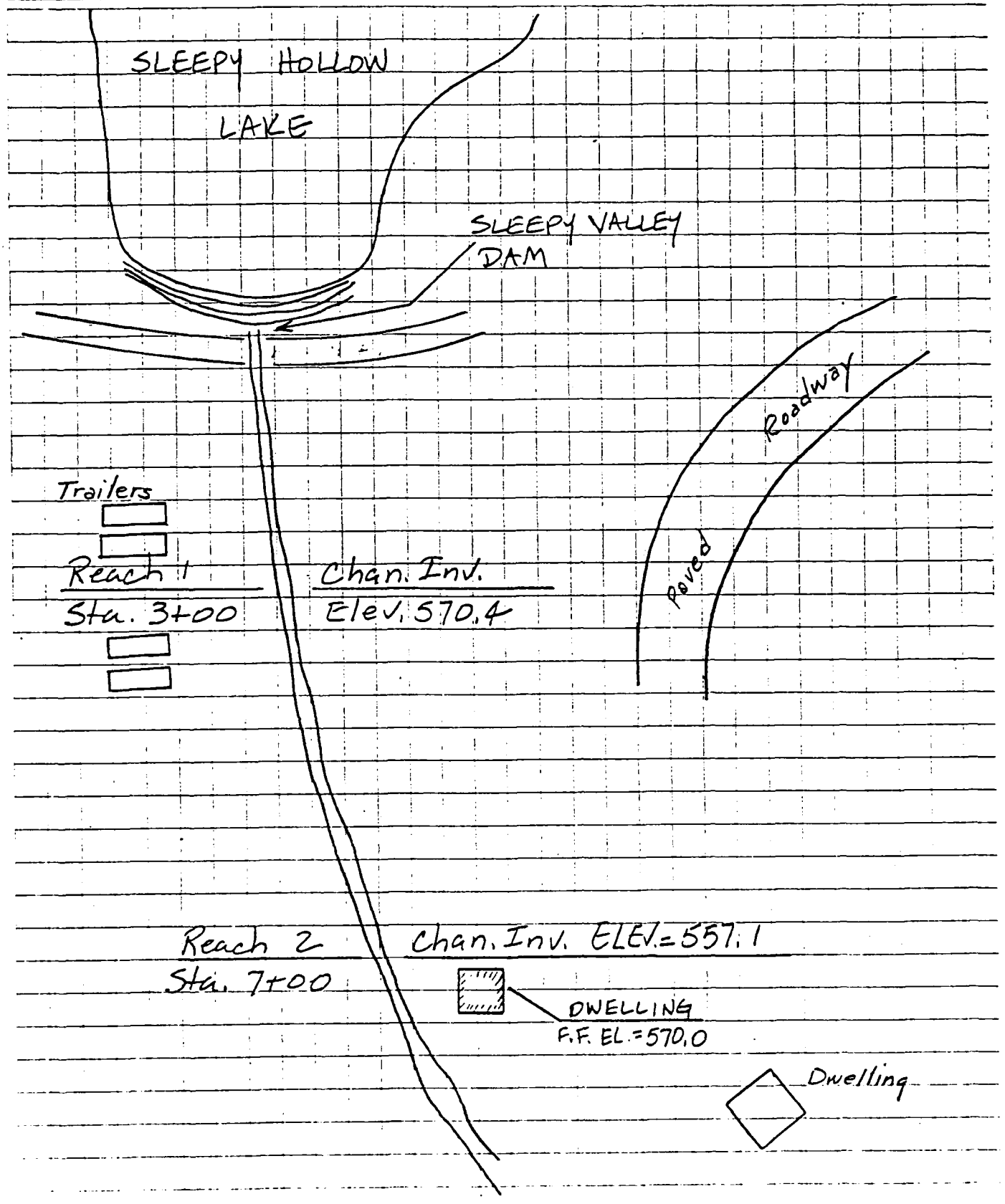
STORCH ENGINEERS

Sheet 14 of 16

Project SLEEPY VALLEY DAM

Made By _____ Date _____

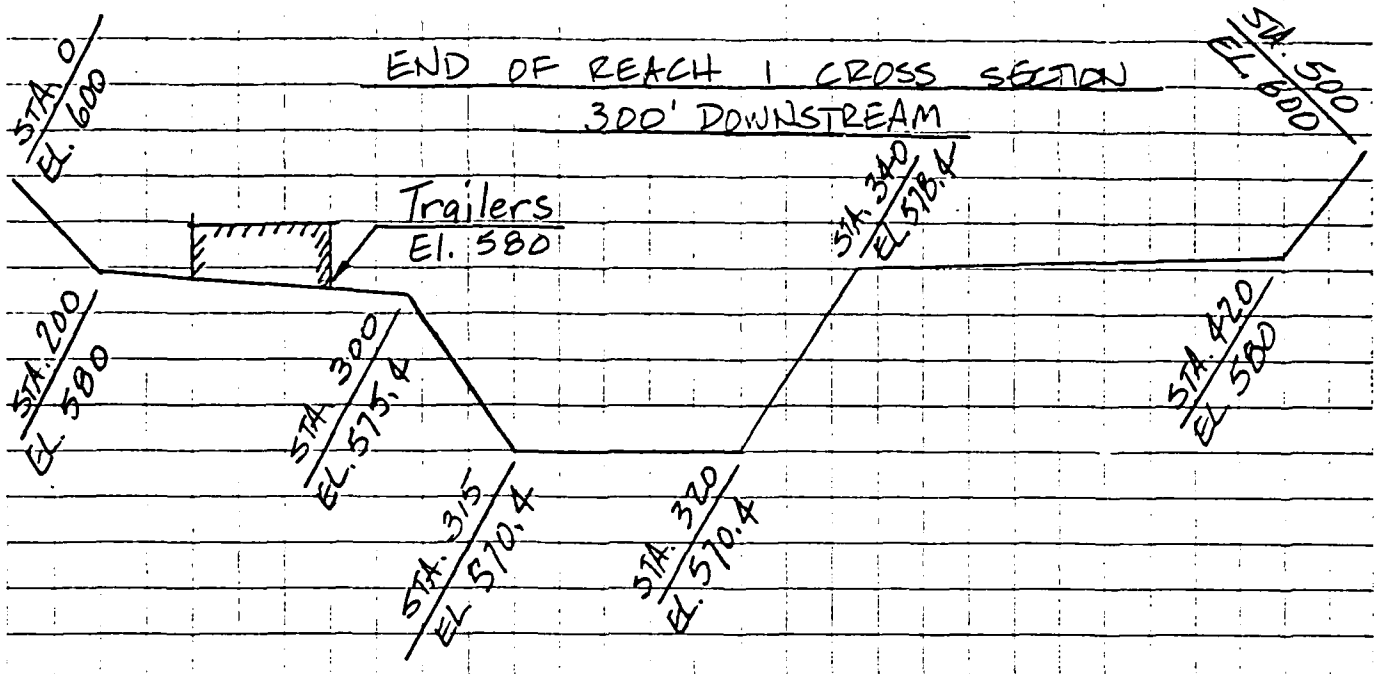
Chkd By JG Date 3/23/81



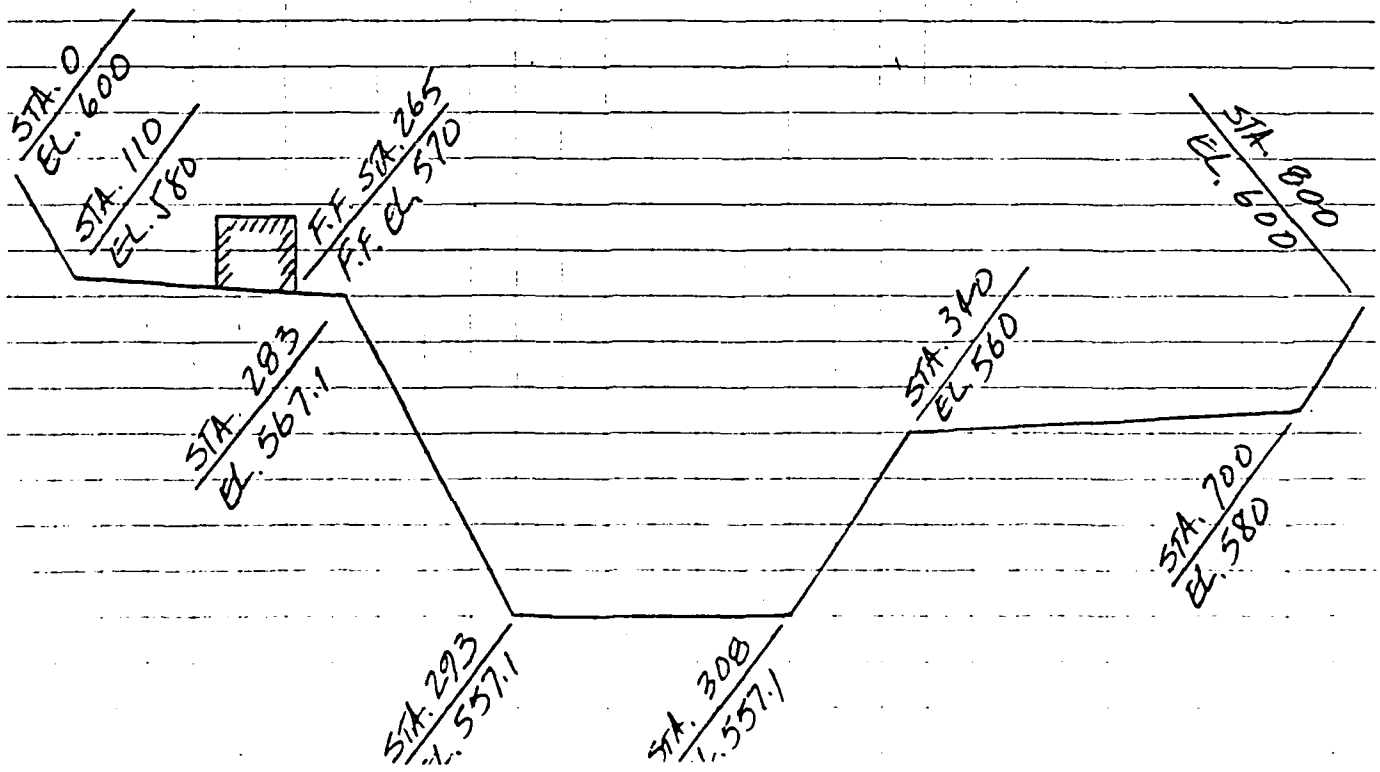
Project SLEEPY VALLEY DAM Made By JLP Date 3-20-81

Chkd By JG Date 3/23/81

END OF REACH 1 CROSS SECTION
300' DOWNSTREAM



END OF REACH 2 CROSS SECTION
700' DOWNSTREAM



Project SLEEPY VALLEY DAM Made By JLP Date 3-20-81

Chkd By JG Date 3/23/81

BREACH RESULTS:

1. Peak Outflow: = 4117 c.f.s.

2. Reach 1: Maximum Stage = 578.8
   8.4' above channel invert
   Trailer not inundated

3. Reach 2: Maximum Stage = 561.9
   4.8' above channel invert
   Dwelling not inundated

HEC - 1 - DAM PRINTOUT

Overtopping Analysis

```
1A1                          NATIONAL DAM SAFETY PROGRAM
A2                        SLEEPY VALLEY DAM, NEW JERSEY
A3                           100 YEAR STORM ROUTING
B     300        0       30                                    0       0       4
R1        S
J         1        1       1
J1        1
K         0   LAKE                              0       0       1
K1           INFLOW HYDROGRAPH TO SLEEPY VALLEY DAM
M         0        2    1.51              1.51       0                       1
O        48
O1 0.038    0.038    0.038    0.038    0.038    0.038    0.038    0.038    0.038    0.038
O1 0.038    0.038    0.038    0.038    0.038    0.038    0.038    0.038    0.038    0.038
O1 0.038    0.038    0.038    0.038    0.075    0.075    0.075    0.075    0.075    0.075
O1 0.165    0.165    0.325    0.325     1.50     1.50    0.325    0.325    0.165    0.165
O1 0.165    0.165    0.075    0.075    0.075    0.075    0.075    0.075
T                                                          1.5     0.15
W2           1.26
X    -1.0    -0.05     2.0
K         1   DAM
K1           ROUTE DISCHARGE THRU DAM
Y                                   1        1
Y1        1                                                585.8      -1
Y4  585.8    586.0    587.0    587.8    588.0    589.0    590.0    592.0    594.0    596.0
Y5        0       41      181      390      450      789     1186     2127     3235     4488
$A        0     18.5     39.7     52.9
$E    574.4      585      600      620
$$    585.8
$D    587.8     2.63      1.5      270
K         1        1                                             1
K1           CHANNEL ROUTING REACH 1
Y                                   1        1
Y1        1
Y6      0.1    0.035      0.1    570.4      600      300    0.014
Y7        0      600      200      580      300    525.4      315    570.4      320    570.4
Y7      340    578.4      420      580      500      600
K         1        2                                             1
K1        CHANNEL ROUTING REACH 2
Y                                   1        1
Y1        1
Y6      0.1    0.035      0.1    557.1      600      700    0.033
Y7        0      600      110      580      283    567.1      293    557.0      308    557.1
Y7      340      560      700      580      800      600
K        99
```

NATIONAL DAM SAFETY PROGRAM
SLEEPY VALLEY DAM, NEW JERSEY
100 YEAR STORM ROUTING

JOB SPECIFICATION

NO	NHR	NMIN	IDAY	IHR	IMIN	METRC	IPLT	IPRT	NSTAN
300	0	30	0	0	0	0	0	4	0

JOPER	NWT	LROPT	TRACE
5	0	0	0

MULTI-PLAN ANALYSES TO BE PERFORMED
NPLAN= 1 NRTIO= 1 LRTIO= 1

RTIOS= 1.00

********** ********** ********** ********** **********

SUB-AREA RUNOFF COMPUTATION

INFLOW HYDROGRAPH TO SLEEPY VALLEY DAM

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
LAKE	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
0	2	1.51	0.00	1.51	0.00	0.000	0	1	0

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	1.50	.15	0.00	0.00

UNIT HYDROGRAPH DATA
TC= 0.00 LAG= 1.26

RECESSION DATA
STRTQ= -1.00 QRCSN= -.05 RTIOR= 2.00

END-OF-PERIOD FLOW

0 MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
									SUM	7.10	4.31	2.79	9364.
										(180.)	(110.)	(71.)	(265.16)

********** ********** ********** ********** **********

HYDROGRAPH ROUTING

ROUTE DISCHARGE THRU DAM

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
DAM	1	0	0	0	0	0	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-586.	-1

STAGE	585.80	586.00	587.00	587.80	588.00	589.00	590.00	592.00	594.00	596.00
FLOW	0.00	41.00	181.00	390.00	450.00	789.00	1186.00	2127.00	3235.00	4488.00
SURFACE AREA=	0.	19.	40.	53.						
CAPACITY=	0.	65.	492.	1415.						
ELEVATION=	574.	585.	600.	620.						

CREL	SPWID	COOW	EXPW	ELEVL	COOL	CAREA	EXPL
585.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COQD	EXPD	DAMWID
587.8	2.6	1.5	270.

PEAK OUTFLOW IS 1497. AT TIME 19.00 HOURS

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIO 1 1.00
HYDROGRAPH AT	LAKE	1.51 (3.91)	1	1493. (42.28)(
ROUTED TO	DAM	1.51 (3.91)	1	1497. (42.39)(
ROUTED TO	1	1.51 (3.91)	1	1496. (42.37)(
ROUTED TO	2	1.51 (3.91)	1	1502. (42.53)(

1 SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	585.80	585.80	587.80
STORAGE	81.	81.	122.
OUTFLOW	0.	0.	390.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	588.85	1.05	145.	1497.	3.50	19.00	0.00

PLAN 1 STATION 1

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
1.00	1496.	576.4	19.00

PLAN 1 STATION 2

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
1.00	1502.	560.1	19.00

HEC - 1 - DAM PRINTOUT

Breach Analysis

```
1A1                          NATIONAL DAM SAFETY PROGRAM
A2                          SLEEPY VALLEY DAM, NEW JERSEY
A3                          100 YEAR STORM ROUTING
B     300       0       30                              0       0       4
B1      5
J       1       1       1
J1      1
K       0    LAKE                          0       0       1
K1         INFLOW HYDROGRAPH TO SLEEPY VALLEY DAM
M       0       2    1.51              1.51       0                       1
O      48
O1 0.038   0.038   0.038   0.038   0.038   0.038   0.038   0.038   0.038   0.038
O1 0.038   0.038   0.038   0.038   0.038   0.038   0.038   0.038   0.038   0.038
O1 0.038   0.038   0.038   0.038   0.075   0.075   0.075   0.075   0.075   0.075
O1 0.165   0.165   0.325   0.325    1.50    1.50   0.325   0.325   0.165   0.165
O1 0.165   0.165   0.075   0.075   0.075   0.075   0.075   0.075
T                                                     1.5    0.15
W2          1.26
X   -1.0   -0.05     2.0
K       1     DAM
K1         ROUTE DISCHARGE THRU DAM
Y                                   1       1
Y1      1                                           585.8      -1
Y4 585.8   586.0   587.0   587.8   588.0   589.0   590.0   592.0   594.0   596.0
Y5      0      41     181     390     450     789    1186    2127    3235    4488
$A      0    18.5    39.7    52.9
$E 574.4     585     600     620
$$ 585.8
$D 587.8    2.63     1.5     270
$B   100       1   574.4     1.0   585.8   587.8
K       1       1                                   1
K1      CHANNEL ROUTING REACH 1
Y                                   1       1
Y1      1
Y6    0.1   0.035     0.1   570.4     600     300   0.014
Y7      0     600     200     580     300   575.4     315   570.4     320   570.4
Y7    340   578.4     420     580     500     600
K       1       2                                   1
K1        CHANNEL ROUTING REACH 2
Y                                   1       1
Y1      1
Y6    0.1   0.035     0.1   557.1     600     700   0.033
Y7      0     600     110     580     283   567.1     293   557.0     308   557.1
Y7    340     560     700     580     800     600
K      99
```

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HYDROGRAPH ROUTING

ROUTE DISCHARGE THRU DAM

ISTAO	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
DAM	1	0	0	0	0	0	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-586.	-1

STAGE	585.80	586.00	587.00	587.80	588.00	589.00	590.00	592.00	594.00	596.00
FLOW	0.00	41.00	181.00	390.00	450.00	789.00	1186.00	2127.00	3235.00	4488.00
SURFACE AREA=	0.	19.	40.	53.						
CAPACITY=	0.	65.	492.	1415.						
ELEVATION=	574.	585.	600.	620.						

CREL	SPWID	COOW	EXPW	ELEVL	COOL	CAREA	EXPL
585.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COOD	EXPD	DAMWID
587.8	2.6	1.5	270.

DAM BREACH DATA

BRWID	Z	ELBM	TFAIL	WSEL	FAILEL
100.	1.00	574.40	1.00	585.80	587.80

BEGIN DAM FAILURE AT 18.50 HOURS

PEAK OUTFLOW IS 4117. AT TIME 19.16 HOURS

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO FLOWS RATIO 1
				1.00
HYDROGRAPH AT	LAKE	1.51	1	1493.
		(3.91)		(42.28)(
ROUTED TO	DAM	1.51	1	3794.
		(3.91)		(107.45)(
ROUTED TO	1	1.51	1	3721.
		(3.91)		(105.37)(
ROUTED TO	2	1.51	1	3641.
		(3.91)		(103.10)(

1 SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	585.80	585.80	587.80
STORAGE	81.	81.	122.
OUTFLOW	0.	0.	390.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	588.42	.62	136.	4117.	.78	19.16	18.50

PLAN 1 STATION 1

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
1.00	3721.	578.8	19.00

PLAN 1 STATION 2

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
1.00	3641.	561.9	19.00

APPENDIX 5

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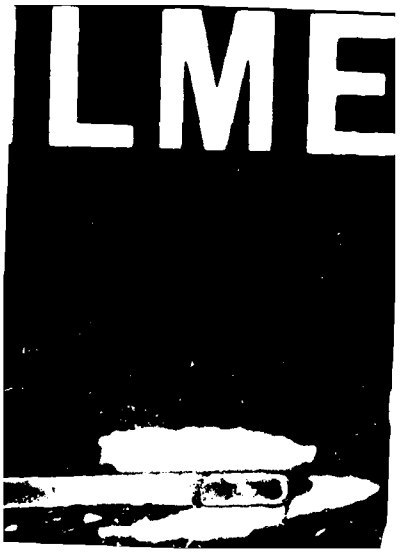
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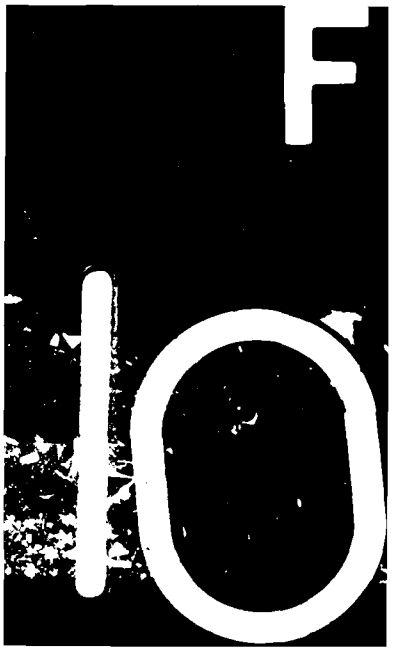
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